Grasses : An Important Underutilized Natural Resource for Sustainable Bioeconomy



Prof. S. R. Yadav

GRASSES

CENTRES OF CIVILIZATION

GREEN GOLD : Grasses a great group of plants of this planet



INDIAN GRASSLANDS

Green Gold

Sewan grassland o

What'll happen if the grasslands disappear in India? Well, to dwell on just one effect, you wouldn't get your glass of the milk in the morning

grass left, and neither will there be an

Holy Cow!



India is the largest producer of milk in the world. That's as long as we take care of our pastures.

Numerous Nomads

Nomads have looked after grasslands in our country for centuries. Some of the prominent ones in India today are the Gujjars, Bakarwaals, Gaddis and Lepchas in the Himalayas; the Maldharis, Rabaris, Charans and Ahirs in western India.

With just a fortieth of the world's land, India supports over a seventh of its cattle and goats. If that isn't bad enough, we devote just five per cent of our land for fodder production as against 60 per cent in the US.





Spiritual Grass

In the shastras it is said that Ganesha should be worshipped with blades of fresh green grass. Is Ganesha, the elephant-headed God, vegetarian? The offering of the blade of grass is actually symbolic, say the faithful. The blade of grass offered to Ganapati denotes that man should be as humble as the blade of grass.



Table 1. The ten subfamilies of grasses represented in the flora of India, showing numbers of tribes, genera, and species recorded in India for each. Tribes are not recognized here for Pharoideae and Aristidoideae because they are redundant, nor for Micrairoideae and Arundinoideae because the number of genera is too small to require tribal designations. Two hundred sixty-six genera have been recorded for the country, representing about 1/3 of the total in the family.

Subfamily	Tribes	Genera	Species + subspecies + varieties
Pharoideae	(1, redundant)	1	1
Bambusoideae	2 (of 3)	32	148
Oryzoideae	3 (of 3)	6	29
Pooideae	8 (of 11)	70	383
Aristidoideae	(1, redundant)	2	15
Panicoideae	6 (of 8)	98	668
Danthonioideae	(1, redundant)	3	5
Chloridoideae	5 (of 5)	43	201
Micrairoideae	(4, not recognized here)	7	50
Arundinoideae	(2, not recognized here)	4	6

Total subfamilies: 10 (12)
Total Genera: 266 (711) (800)
Total species: 1506 (12000)

GRASSES: GREEN GOLD





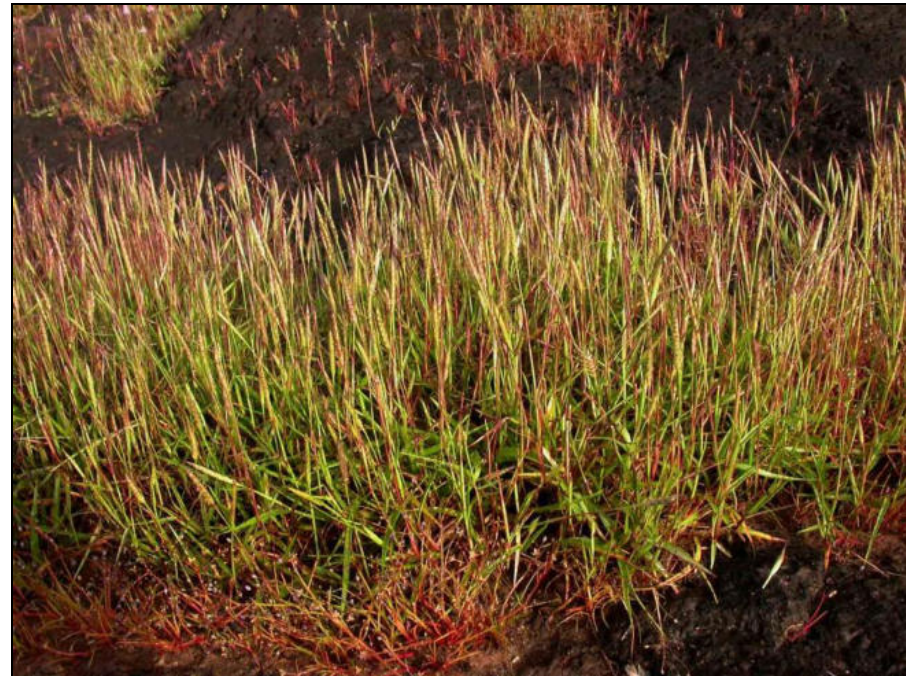
- ❑GRASSES AND FOOD
- ❑GRASSES AND FODDER
- ❑GRASSES AND COVER
- ❑GRASSES AND SOIL CONSERVATION
- ❑GRASSES AND RESTORATION
- ❑GRASSES AND WILD LIFE
- ❑GRASSES AND BIOREMEDATION
- ❑GRASSES AND CLIMATE
- ❑GRASSES AND SUGAR
- ❑GRASSES AND MEDICINE



GRASSES: GREEN GOLD

- ❑GRASSES AND AROMATIC OILS
- ❑GRASSES AND BIODIVERSITY CONSERVATION
- ❑GRASSES AND BIOMASS PRODUCTION
- ❑GRASSES AND SHELTER
- ❑GRASSES AND PAPER INDUSTRY
- ❑GRASSES AND ALCOHOLE INDUSTRY
- ❑GRASSES AND MICROBES
- ❑GRASSES AS ORNAMENTAL PLANTS
- ❑GRASSES AND LAND SCAPING
- ❑GRASSES AND CIVILIZATIONS



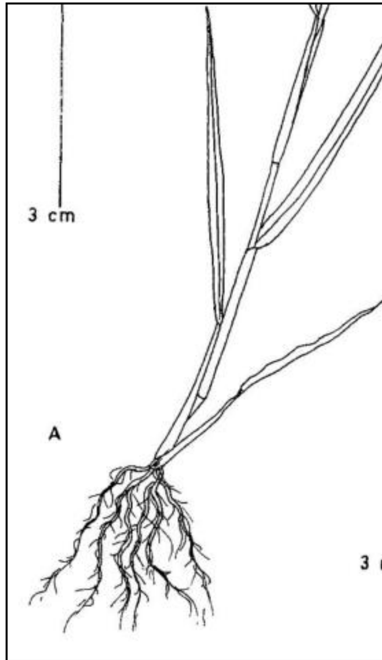


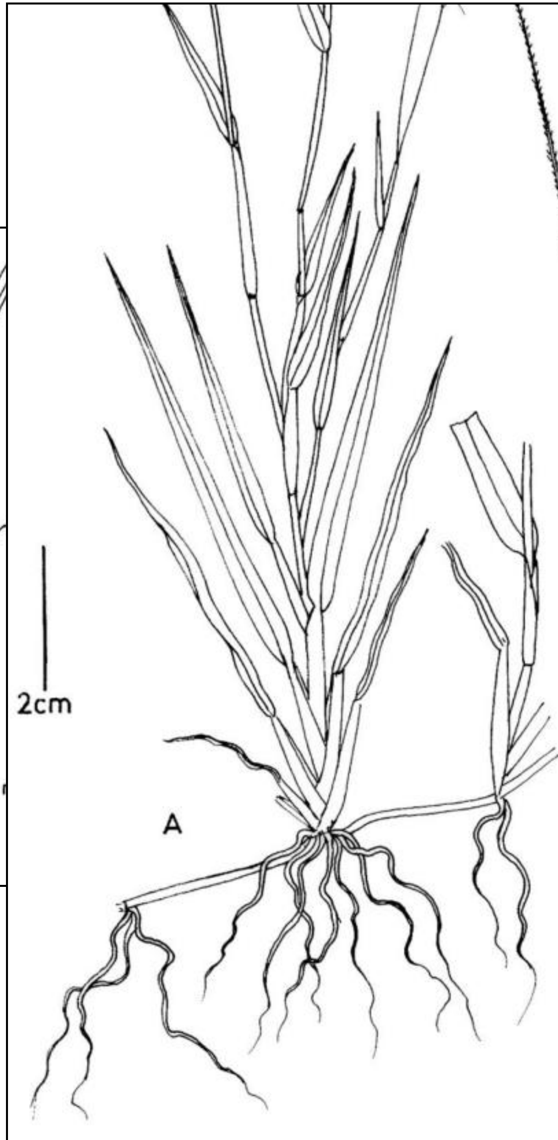
GRASSES: GREEN GOLD

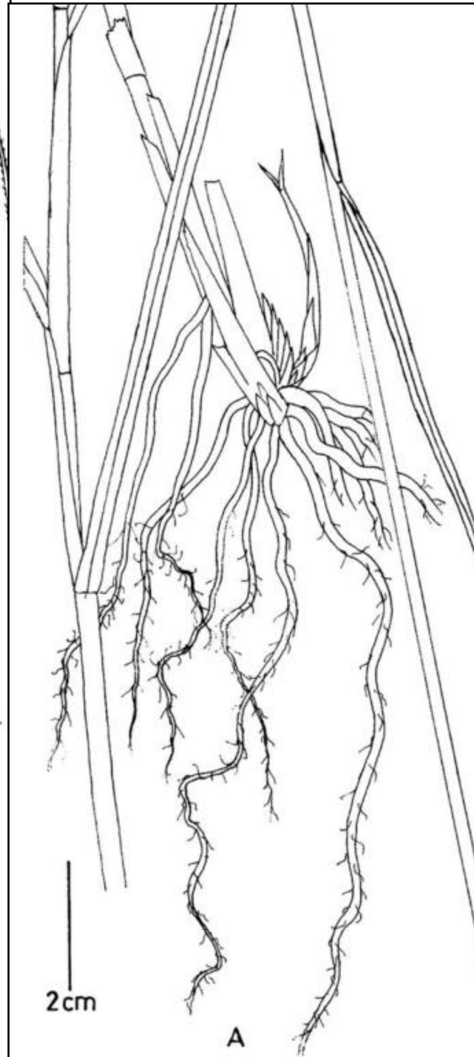
- GRASSES AND BIO-ENZYME
- HARMFUL GRASSES
- POISONOUS GRASSES
- GRASSES : WILD RELATIVES
- GRASSES AND RELIGION
- GRASSES AS BIOINDICATORS
- GRASSES AND DAIRY INDUSTRY
- GRASSES AND MEAT PRODUCTION
- GRASSES AND ECOSYSTEM HEALTH

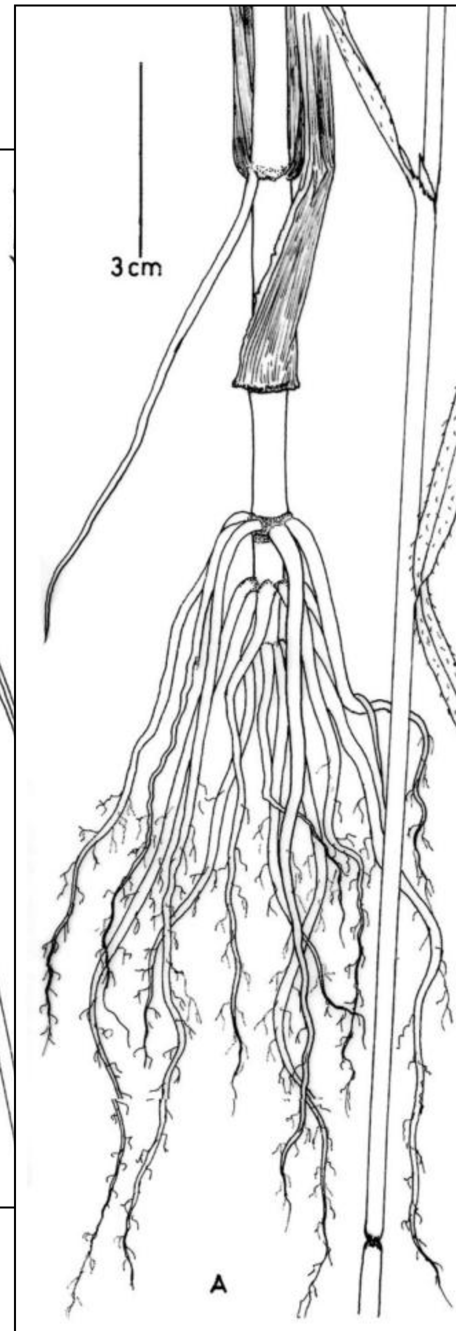


Grasses may be annual or perennial.

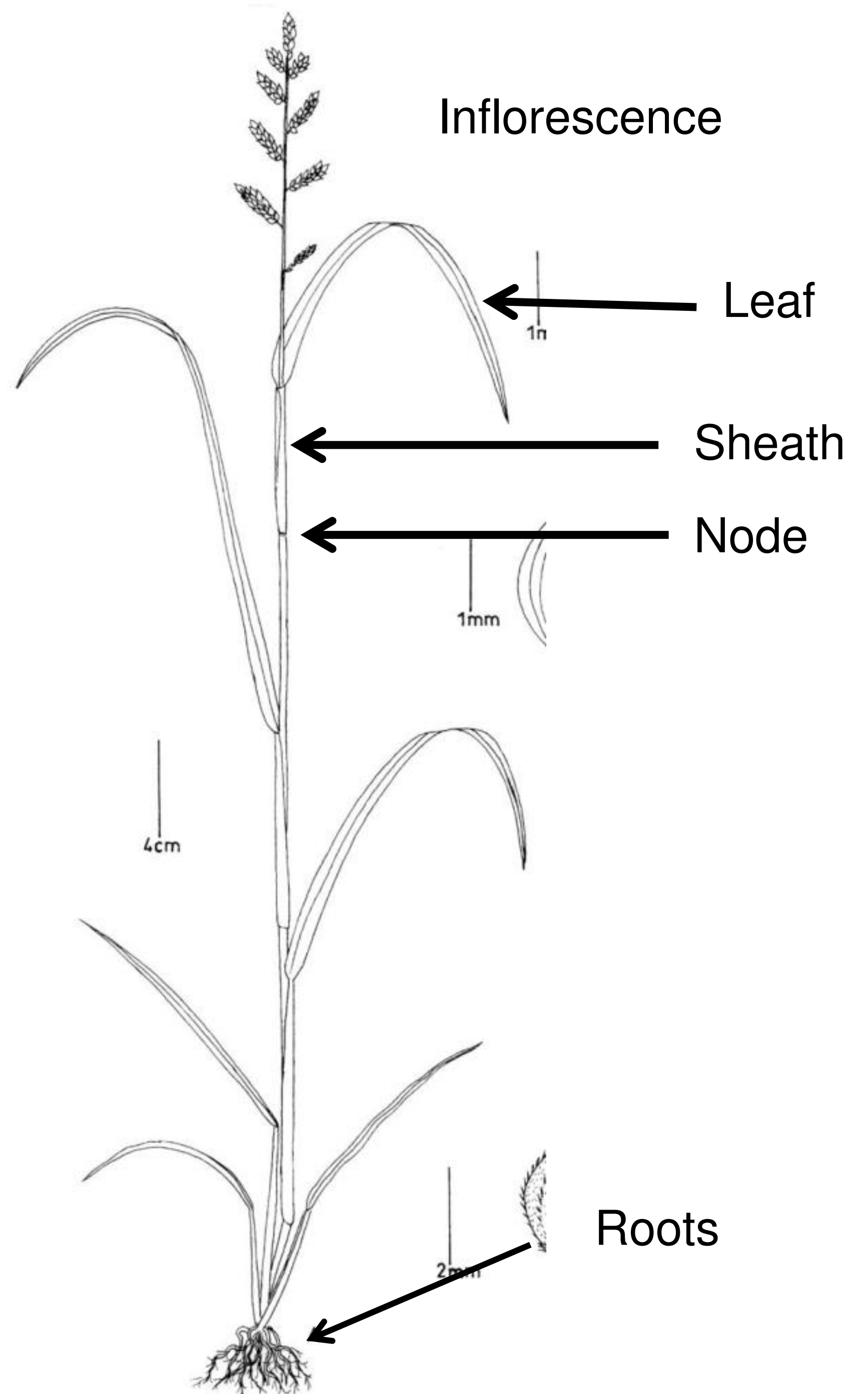




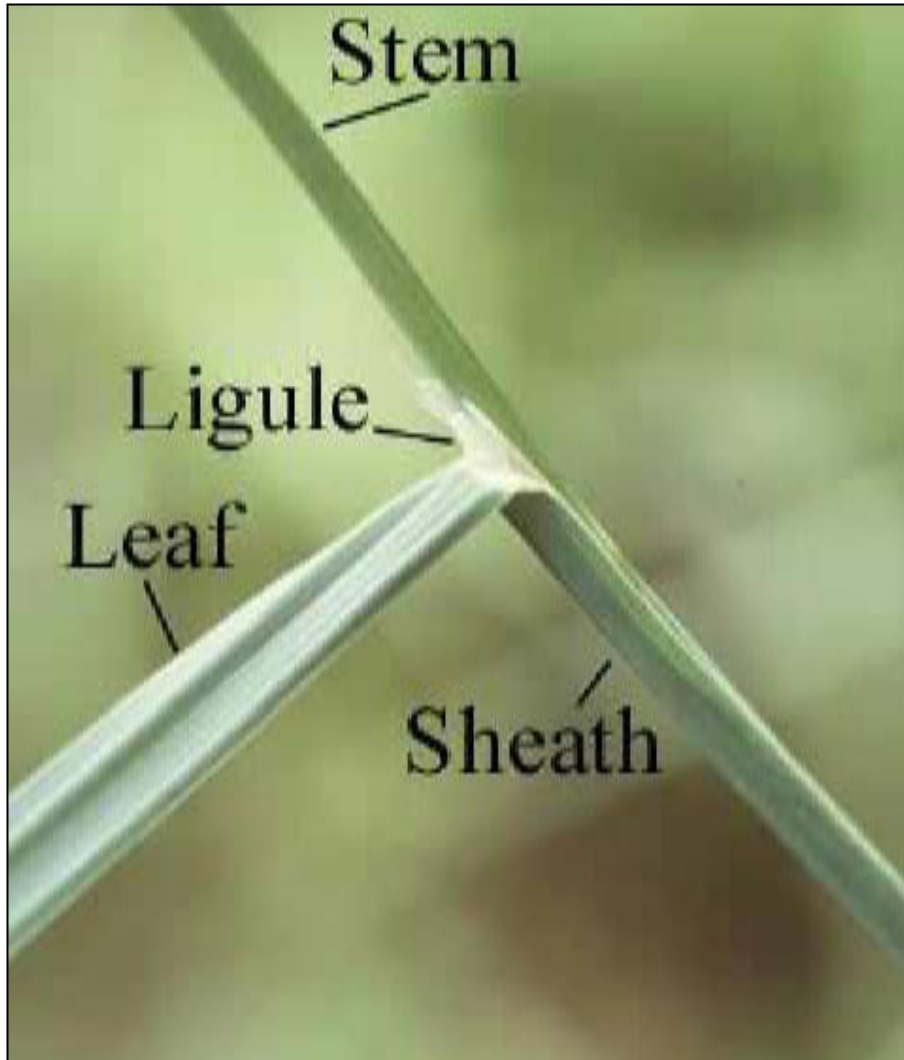




- The aerial stem called culm consists of solid nodes separated by short or long internodes.
- Culms are rounded or flattened.
- Leaves born in two rows alternately along the culm at the nodes.

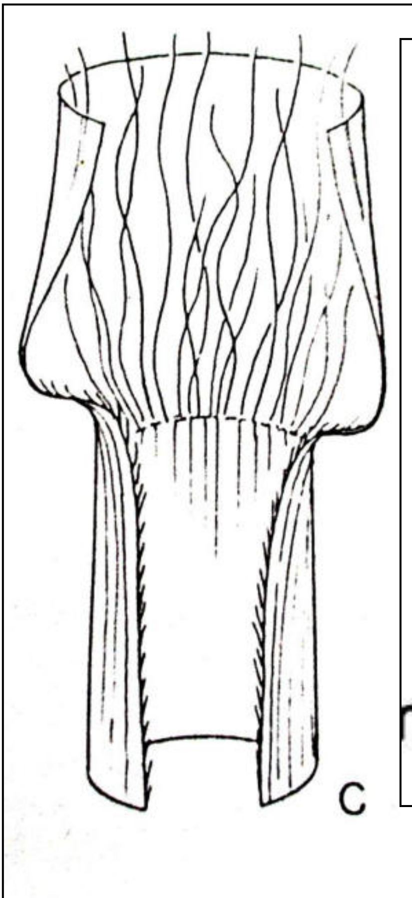


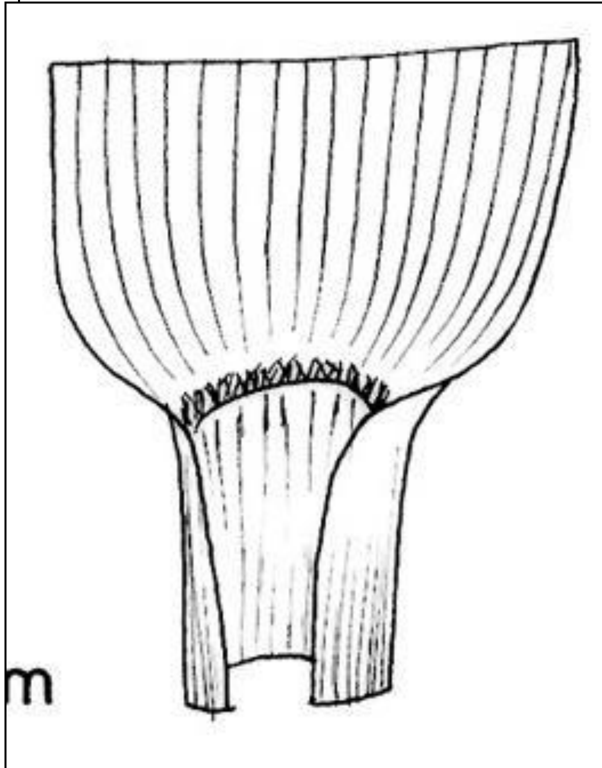
Leaves composed of **a sheath** which surrounds the culm; **leaf blade** which is usually narrow, elongated, with parallel veins and **the ligule**, a thin membrane or row of hairs at the junction of the sheath and blade.



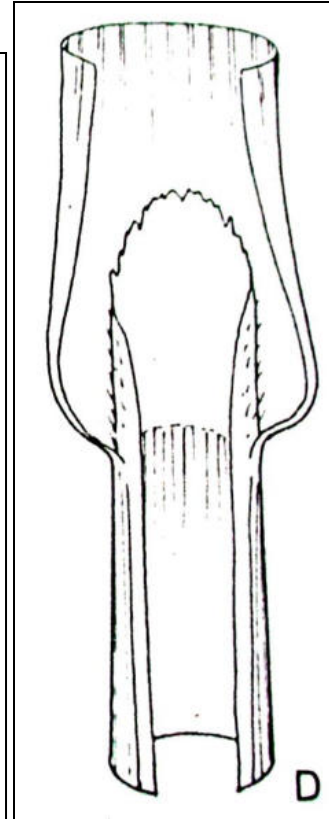
Auricle

Ligule

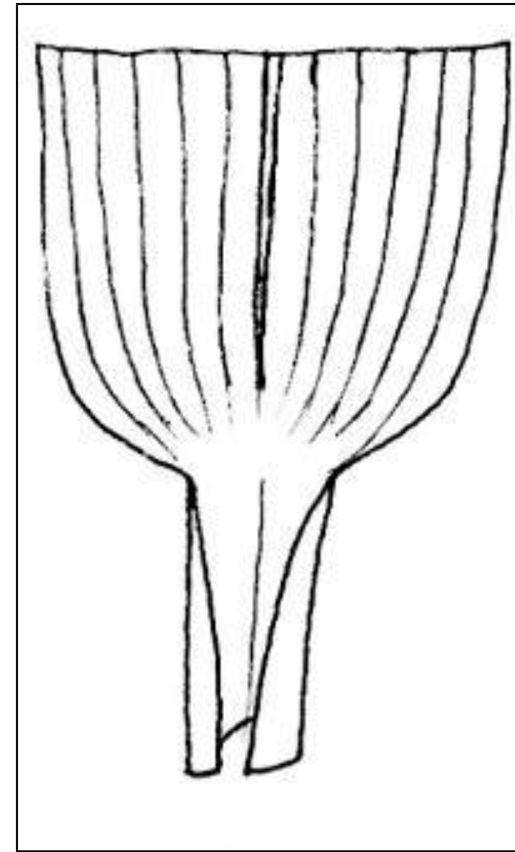




Hairy



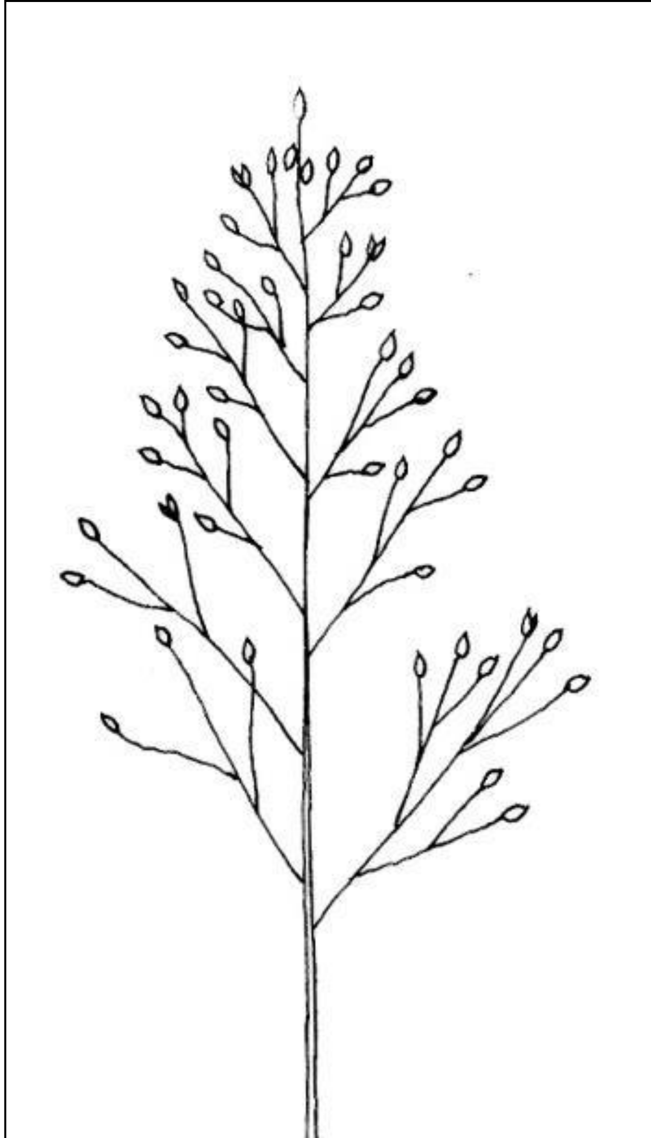
Membranous



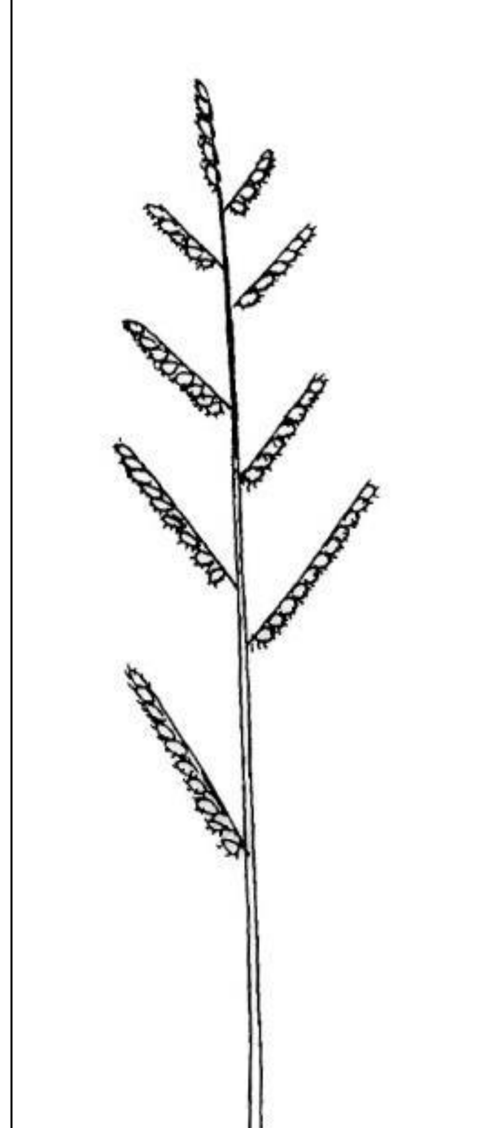
Ligule absent

THREE TYPES INFLORESCENCE IN GRASSES ARE COMMON IN GRASSES

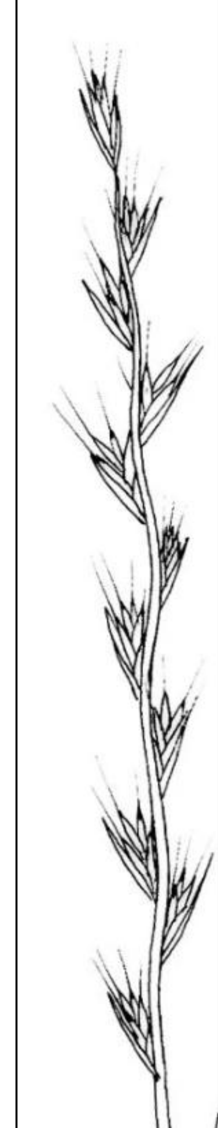
Panicle



Raceme



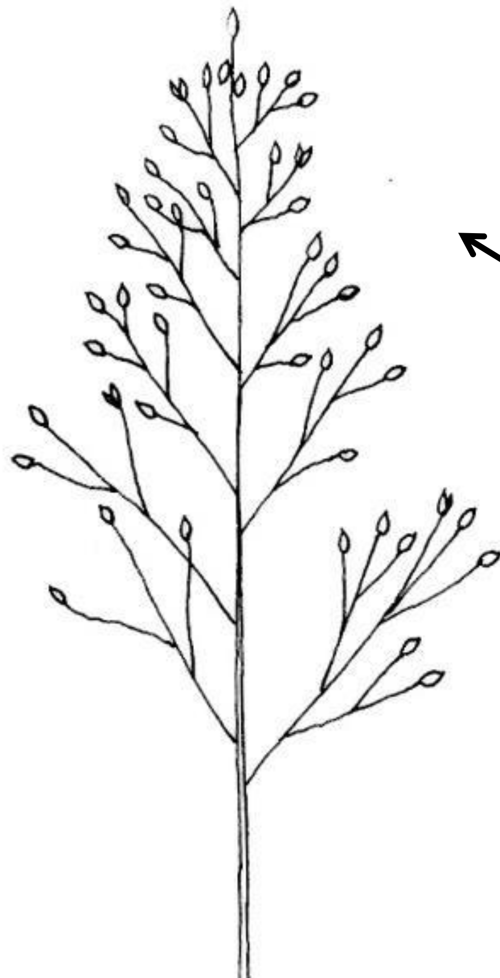
Spike



Panicle

True panicle

False panicle

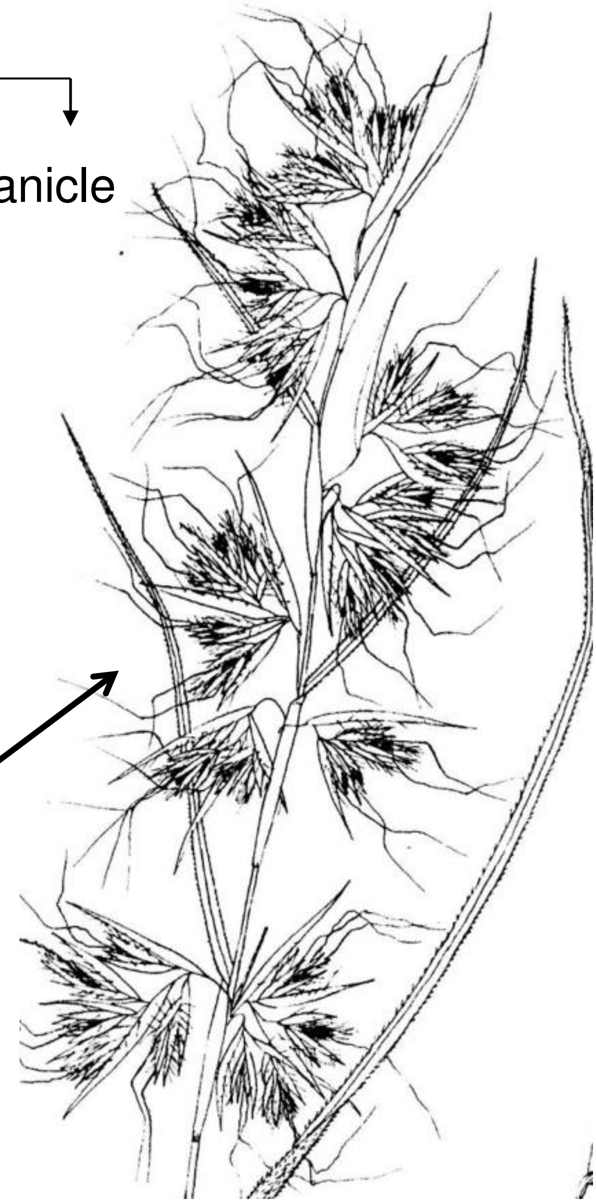




Solitary spikelet



Group of spikelets

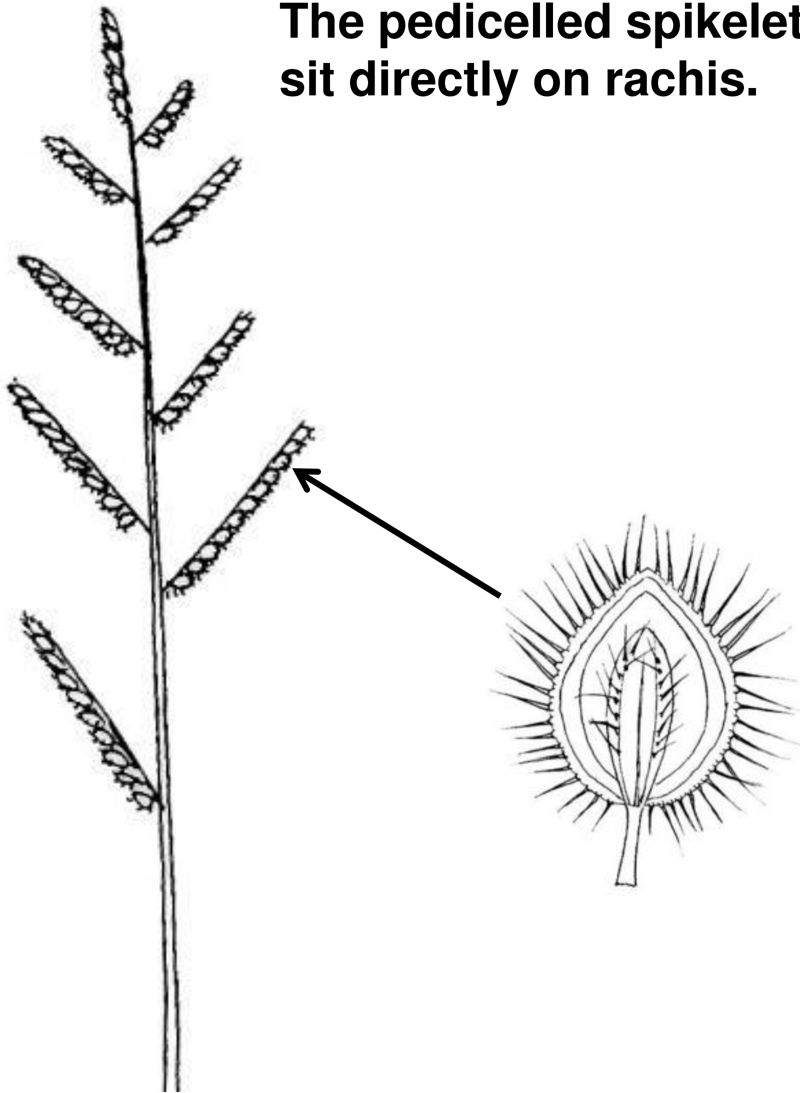


A panicle bears a number of branches bearing pedicelled spikelets.

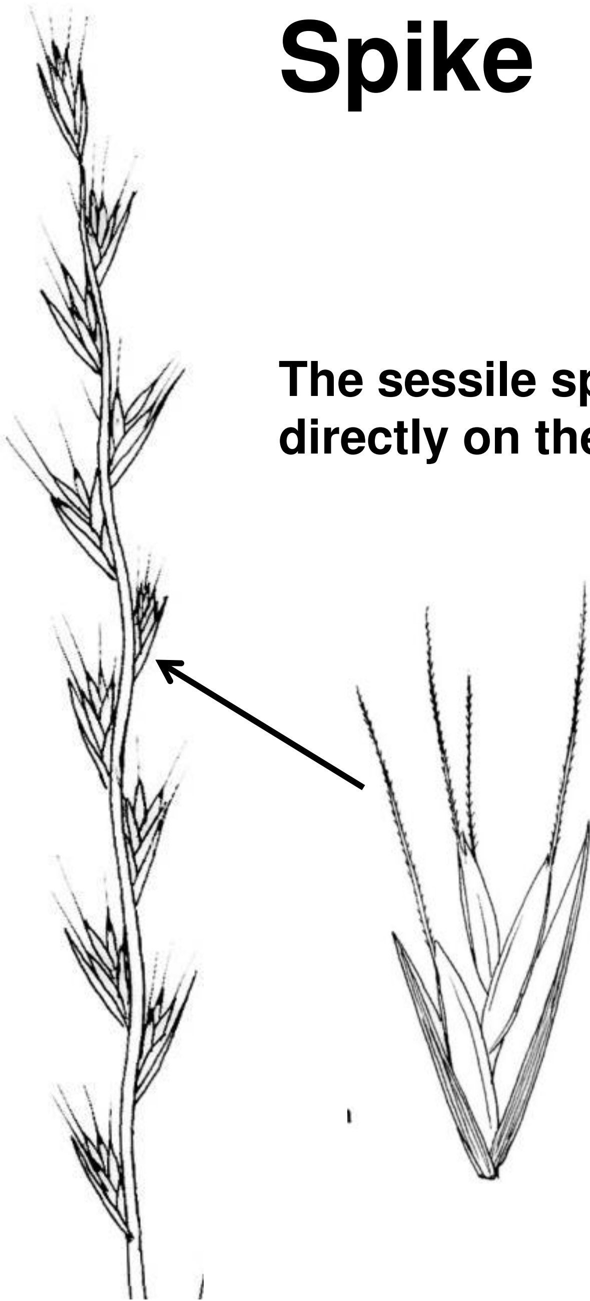

False panicle

Raceme

The pedicelled spikelets sit directly on rachis.

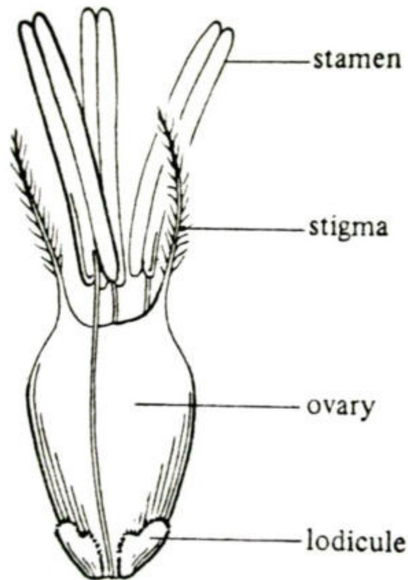


Spike

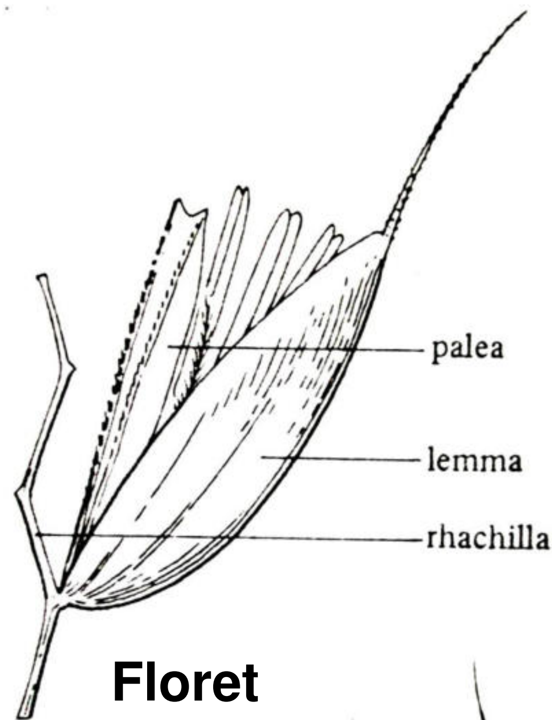


The sessile spikelets sit directly on the rachis.

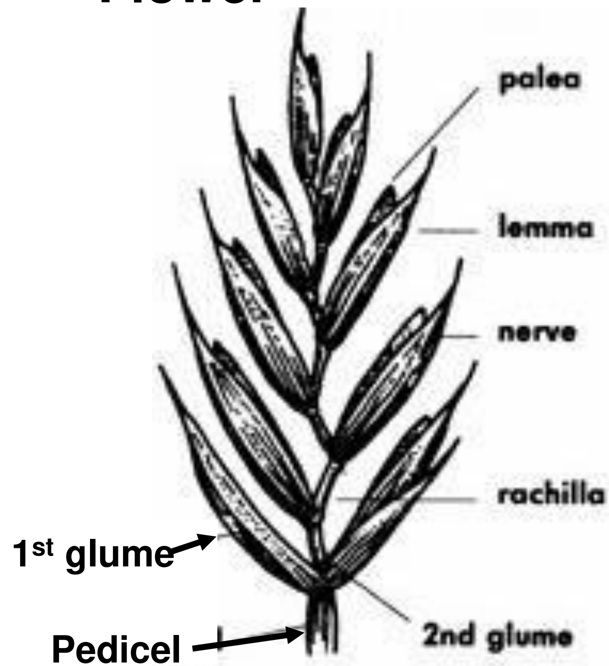
GRASS FLOWER

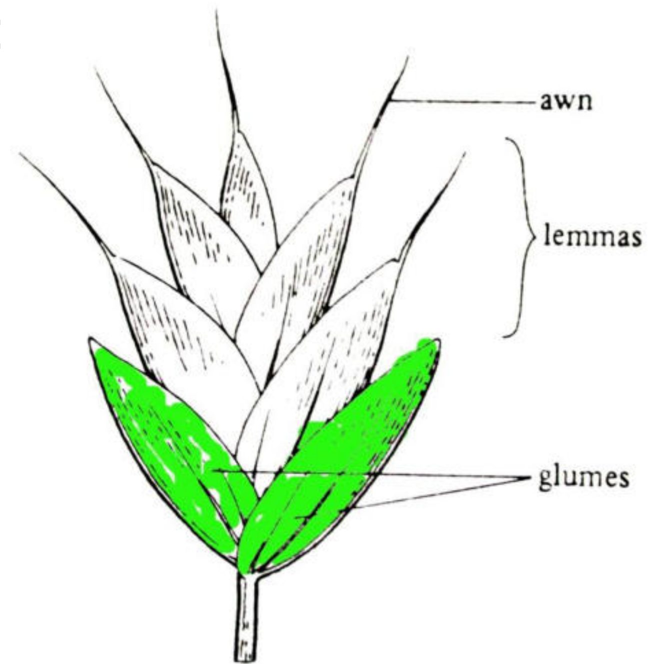


Flower



Floret

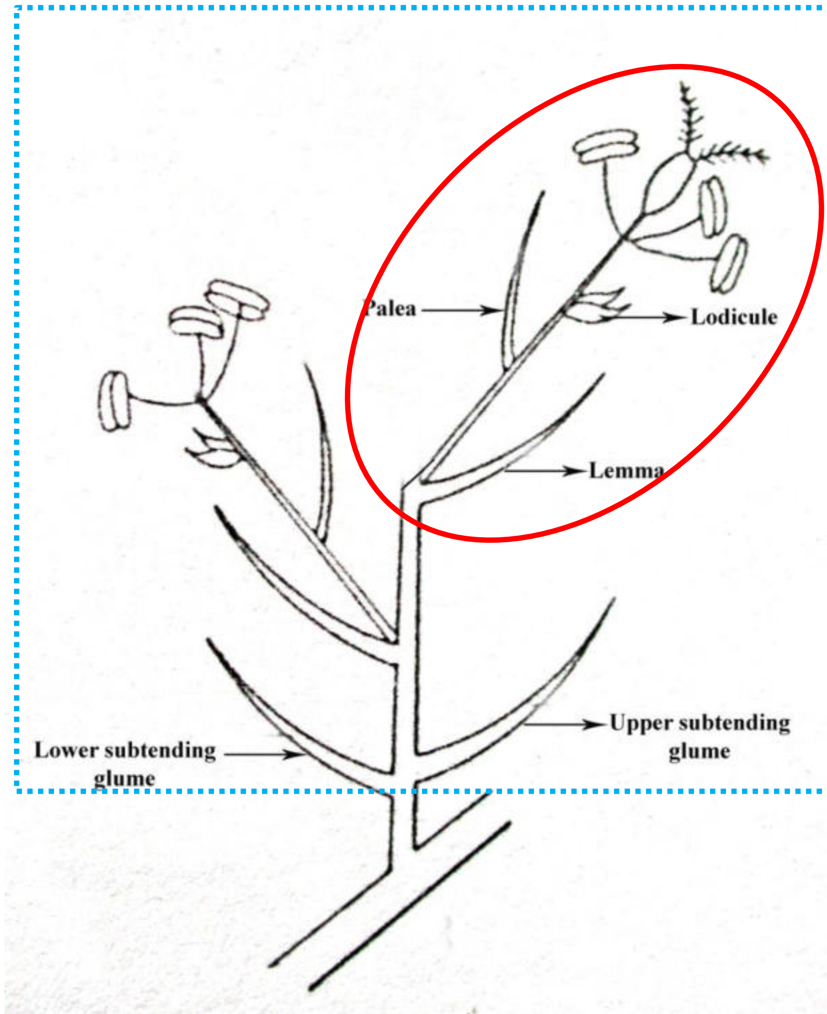




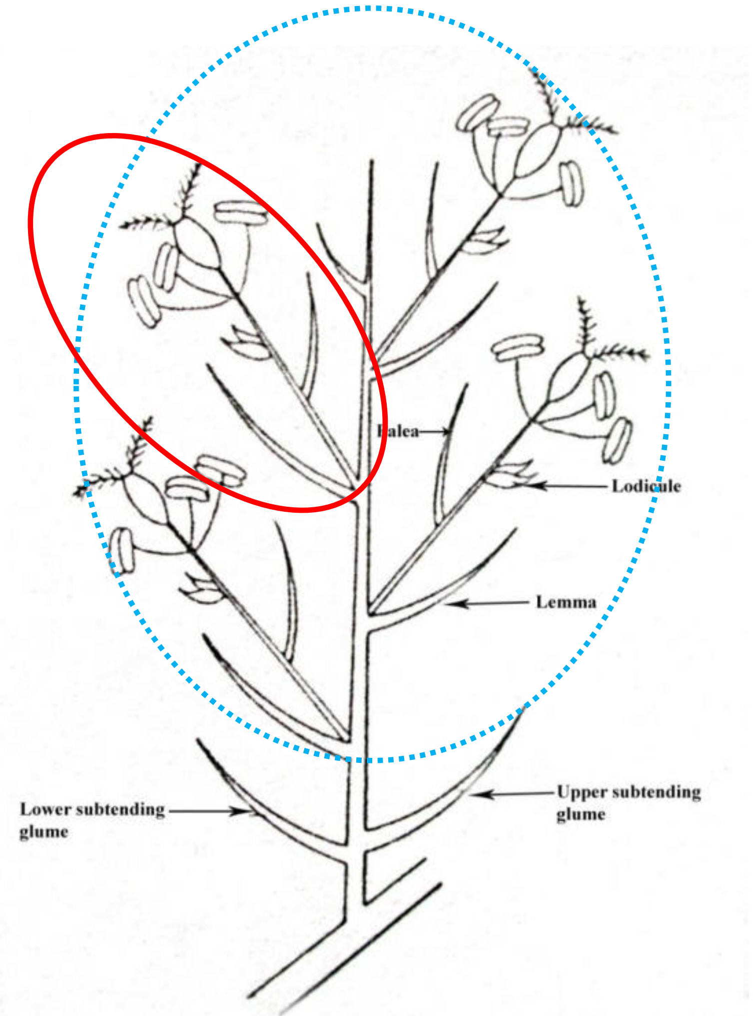
Spikelet

Morphology of Spikelets

Flower

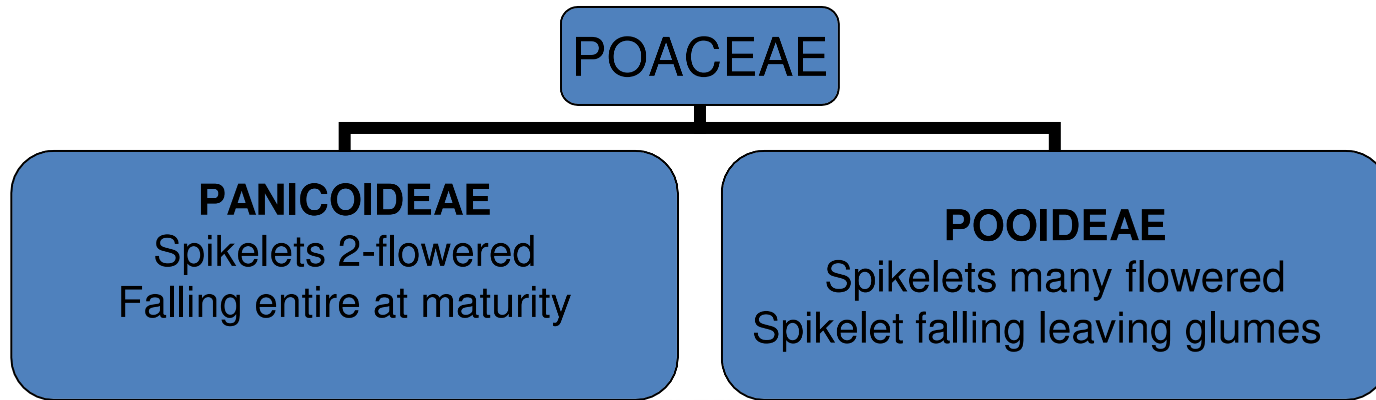


Panicoideae



Pooideae

Systematics treatment





(Family) **POACEAE** (Bor, N. L. 1960)

(Subfamily) **PANICOIDEAE** | **POOIDEAE**

(Tribes)

Andropogoneae

Andropogon
Apluda
Apocopsis
Arthraxon
Bothriochloa
Cymbopogon
Dichanthium
Heteropogon
Ischaemum

Paniceae

Alloteropsis
Brachiaria
Cenchrus
Digitaria
Echinochloa
Panicum
Paspalidium
Spinifex
Trachys

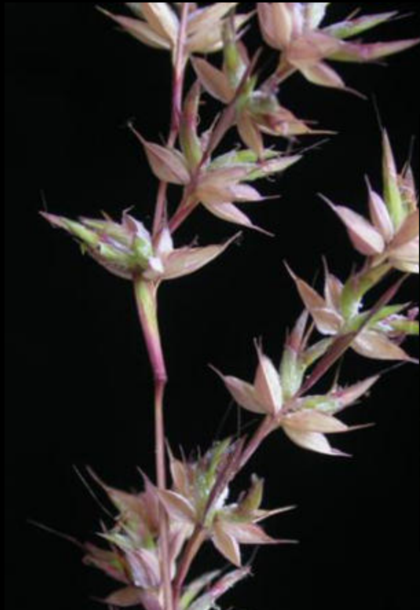
Maydeae

Chionachne
Coix
Euchlaena
Trilobachne
Tripsacum
Zea

POOIDEAE

1. AELUROPODEAE (1)
2. AGROSTIDEAE (1)
3. ARISTIDEAE (1)
4. ARUNDINEAE (2)
5. ARUNDINELLEAE(3)
6. AVENEAE (2)
7. BAMBUSEAE (2)
8. CENTOTHECEAE (1)
9. CHLORIDEAE (7)
10. DANTHONIEAE (2)
11. ERAGROSTEAE (16)
12. FESTUCEAE (3)
13. GARNOTIEAE (1)
14. HUBBARDIEAE (1)
15. ISACHNEAE (2)
16. LEPTUREAE (1)
17. ORYZEAE (4)
18. PAPPOPHOREAE(1)
19. PEROTIDEAE (1)
20. PHALARIDEAE (1)
21. POMMEREULLEAE(1)
22. SPOROBOLEAE (2)
23. THYSANOLAENEAE (1)
24. TRITICEAE (1)
25. ZOYSIEAE (3)

GRASSES – identification of grasses is not that difficult as we think


Apluda


Indopoa


Isachne


Cyrtococcum


Themeda


Psudanthisteria


Glyphochloa


Coix


Glyphochloa


Tragus



Chionachne



Apocopis



Arundo



Arthraxon



Avena



Cenchrus



Centotheca



Arthraxon



Arthraxon



Acrachne



Coix



Acroceros



Chloris



Cymbopogon



Alloteropsis



Cymbopogon



Dichantomis



Cyrtococcum



Stipagrostis

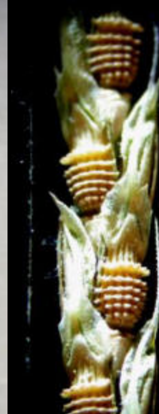


Chloris


Arthraxon


Theleopogon


Manisuris


Glyphochloa


Hackelochloa


Tragus

Grasses`and legumes have been the principal crops of most civilizations


Ischemum


Elyonurus


Bothriochloa


Leersia


Lophopogon


Cenchrus


Rhynchelytrum


Tetrapogon


Glyphochloa


Glyphochloa


Glyphochloa


Arthraxon



Elyonurus



Glyphochloa



Manisuris



Ophiuros



Dichanthium



Theleopogon



Tragus



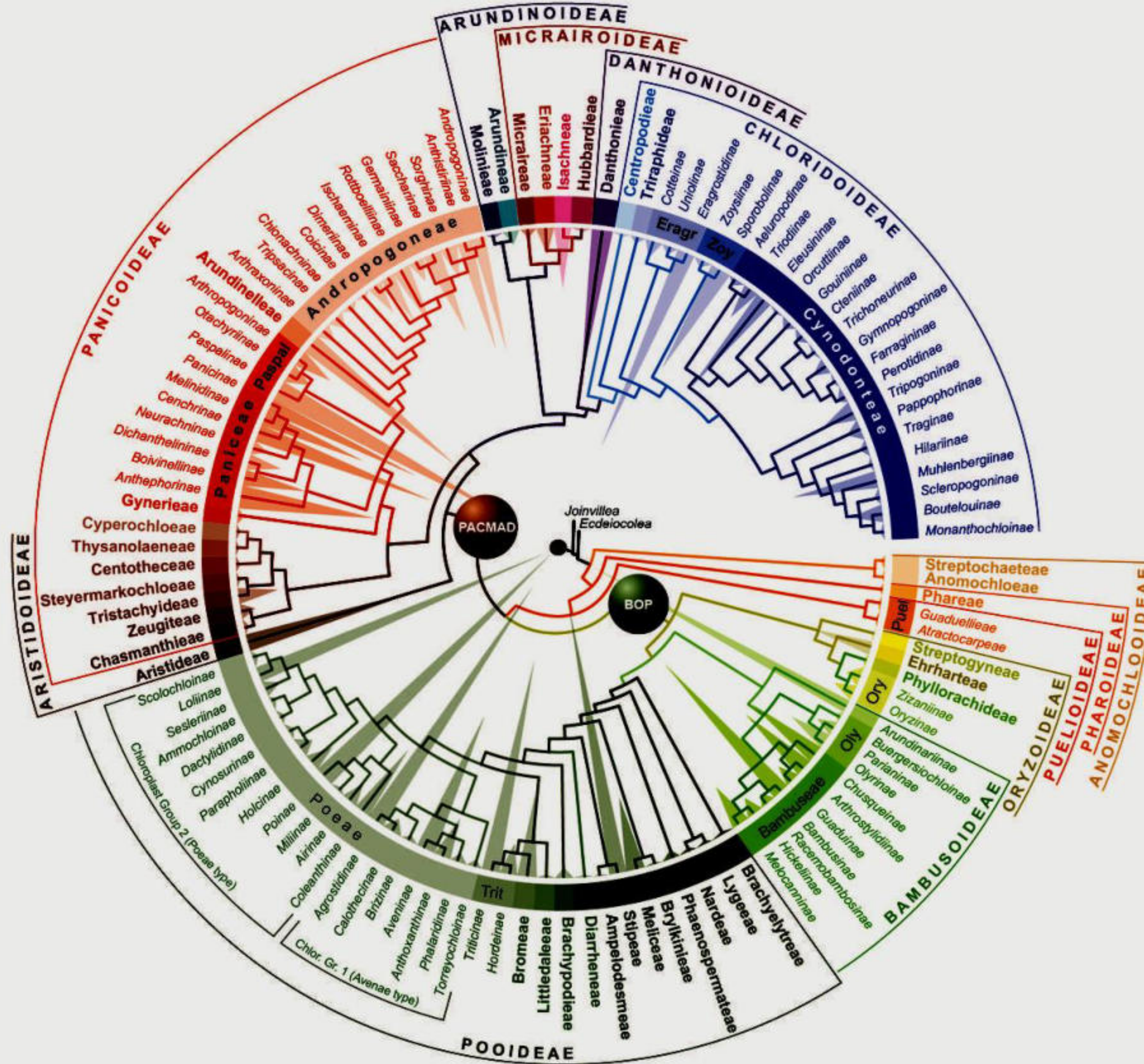
Centotheca



Lophopogon



Vetiveria



PACMAD clade

12.Chloridoideae (1600)

11. Danthonioideae (300)

10. Micrairoideae (200)

9. Arundinoideae (50)

8. Panicoideae (3250)

7. Aristidoideae (350)

BOP clade

6. Pooideae (3850)

5. Bambusoideae – bamboos (1450)

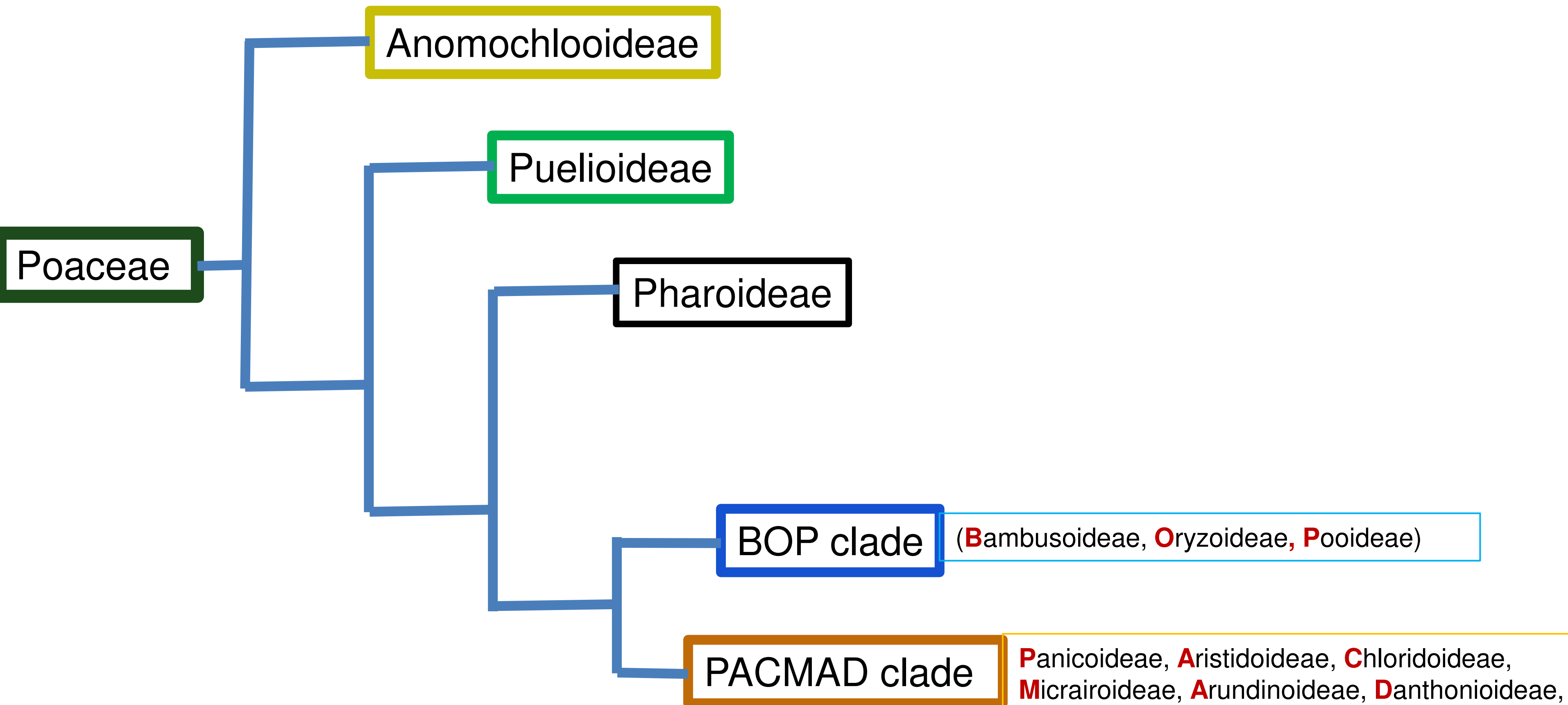
4. Oryzoideae (110)

3. Puelioideae (11)

2. Pharoideae (13)

1. Anomochlooideae (4)

Anomochlooideae is a subfamily of the true grass family Poaceae. It is sister to all the other grasses. It includes perennial herbs that grow on the shaded floor of forests in the Neotropics. There are two genera, ***Anomochloa*** and ***Streptochaeta***, each in its own tribe. This subfamily is the **most early-diverging lineage of the grasses.**



Subfamilies and tribes of the grasses (Poaceae) early clades

I. Subfamily: Anomochlooideae: Anomochloeae, Streptochaeteae

1, *Anomochloa*, 2. *Streptochaeta*

II. Subfamily: Pharoideae: Phareae

3. *Leptaspis*, 4. *Pharus*, 5, *Scrotochloa*

III. Subfamily: Puelioideae: Atractocarpeae Guaduellieae

6. *Guaduella*, 7. *Puelia*, 8. *Streptogyna*



Puelioideae genera, *Guaduella* and *Puelia*, each in its own tribe. Its members grow in the understory of rainforests. This subfamily is one of the earliest-diverging grass lineages, sister to the big BOP and PACMAD clades:

Guaduella is a genus of African plants the only genus in the tribe Guaduellieae. It is one of the early-diverging lineages in the grasses, but used to be included in the bamboos. Species. Guaduella densiflora Pilg. - Nigeria, Cabinda, Cameroon, Republic of Congo, ..



Pharoideae contains the single tribe Phareae genera ***Leptaspis*** and ***Pharus*.** Grow on the shaded floors of tropical to warm temperate forests.
It is one of the earliest-diverging grass lineages, older than the big BOP and PACMAD clades:



Anomochloa marantoidea Brongn.
Anomochloa is a genus of Brazilian plants in the grass family, the only genus in the tribe Anomochloeae.

Elizabeth A. Kellogg, XIII Flowering Plants-Monocots - Poaceae in The Families and Genera of Vascular Plants by K. Kubitzki (2015)

IV. Subfamily: Oryzoideae

Streptogyna,

Ehrharta,

***Leersia*,**

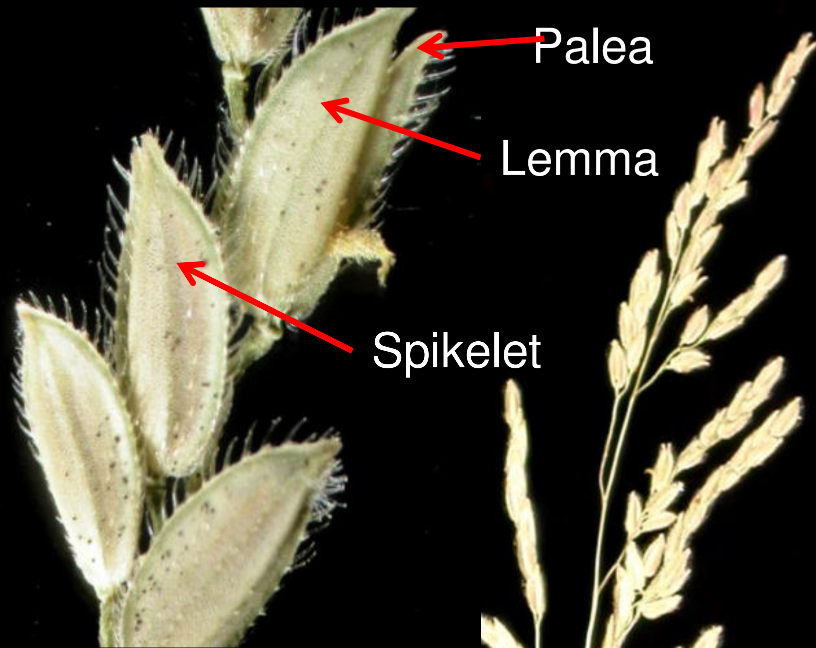
Oryza (syn. –***Porteresia***),

Hygroryza,

Zizania,

Elizabeth A. Kellogg, XIII Flowering Plants-Monocots - Poaceae in The Families and Genera of Vascular Plants by K. Kubitzki (2015)

13. LEERSIA



Fertile Lemma solitary, tip of pedicel without lips (two glumes)



Leersia hexandra

Glumes minute or supressed, Stamens 6

Tribe: **Oryzeae**
Subtribe: Oryzinae

LEERSIA Soland. ex Sul.
[In honor of Johann Daniel Leers (1727–1774) German apothecary and botanist]

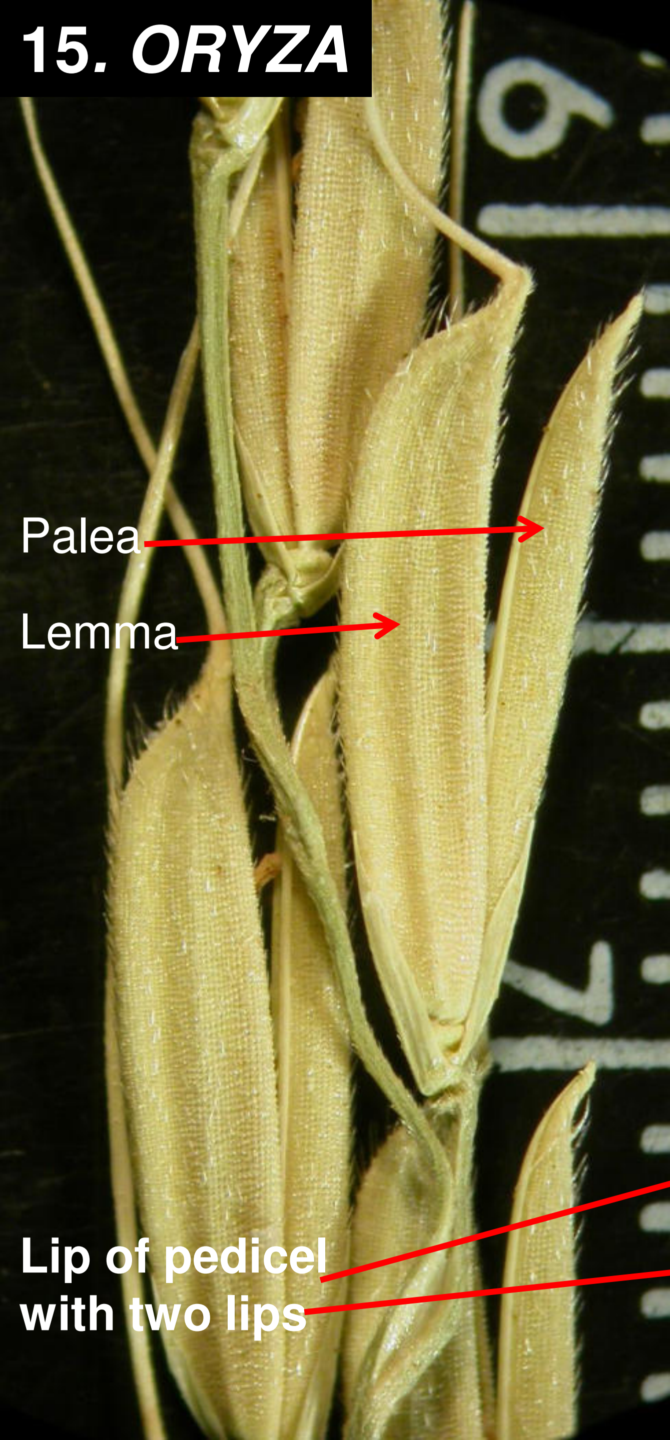
Species ~ 20 in world, of which 2 occur in India.

Genus distribution: Africa, America, Australia, Europe, Tropical and warm Temperate regions, especially in east Asia, Burma, Bangladesh, Sri Lanka, Malaya, Malaysian Islands, Philippine and West Indies.

Leaf-blades linear, acute or acuminate; aquatic; fertile lemma solitary; tip of pedicel without lips; spikelets imbricate.


15. ORYZA
Paddy field
Oyza sativa

15. *ORYZA*



Oryzeae

ORYZA L.

[Classical Greek name for rice (*Oryza*), also spelled as *oryzon*]

Species ~ 23, of which ~ 10 species and many varieties occur in India.

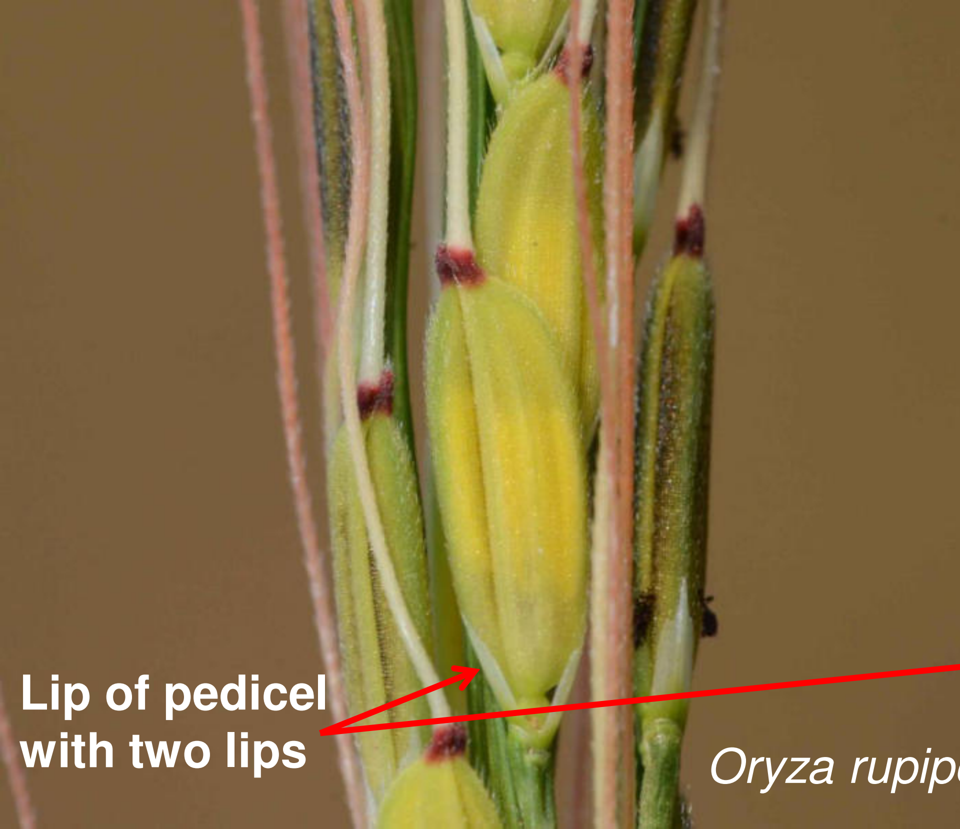
Genus distribution: Tropical parts of the world.

Fertile lemma supported by two empty scales; tip of pedicel with 2 lips.

Fertile lema supported by two empty scales, tip of pedicels with two lips (two reduced glumes)

15. *ORYZA*





Oryza rupipogon

15. *ORYZA* (PORTERESIA)



Porteresia coarctata

Oryzeae

PORTERESIA Tateoka

[In honor of Roland Portères (1906–1974) French ethno botanist]

A monotypic grass genus.

Genus distribution: Burma and Malaysia.

Perennial. Leaf-blades coriaceous with tuberculate prickly margins.

Leaf blade linear, culms not floating, panicle contracted

Oryzeae

Subtribe: **Zinaniinae**



HYGRORYZA Nees

(Gk *hygros,* moisture. A swamp grass similar to *Oryza* but floating instead of rooted)

A monotypic grass genus.

Genus distribution: Bangladesh, Burma, Malaya and Sri Lanka.

Leaf-blades ovate-oblong or ovate-lanceolate with inflated sheaths; a floating grass; glumes absent; floret one; lemma awned.

Leaf blade broadly ovate, culms floating

V. Subfamily: Bambusoideae

BOP clade

Bamboos **(Bambusoideae) : 1,462 (known species) species in 115 genera**

Arundinarieae Arundinarieae is a tribe of bamboo in the grass family, placed in its own supertribe Arundinarodae and containing a single subtribe, Arundinariinae, and 30 genera.

Bambuseae The Bambuseae are the most diverse tribe of bamboos in the grass family (Poaceae). It consists of woody species from tropical regions, including some giant bamboos. Their sister group are the small herbaceous bamboos from the tropics in tribe Olyreae, while the temperate woody bamboos (Arundinarieae) are more distantly related. The Bambuseae fall into two clades, corresponding to species from the Neotropics (subtribes Arthrostylidiinae, Chusqueinae, and Guaduinae) and from the Paleotropics (subtribes Bambusinae, Hickeliinae, Melocanninae, and Racemobambosinae). The 68 genera are placed in seven subtribes:

Olyreae Olyreae is a tribe of grasses in the bamboo subfamily (Bambusoideae). Unlike the other two bamboo tribes, Olyreae are herbaceous and do not have a woody stem. Their sister group are the tropical woody bamboos (Bambuseae).[2] Olyreae grow in the understorey of humid tropical forests. They are mainly distributed in the Neotropics around the Amazon Basin but there is also one species from Africa, Olyra latifolia, and one from New Guinea, Buergersiochloa bambusoides.[2] The tribe is divided into three subtribes with 21 genera:[1]

97. *BAMBUSA*

Bambusa vulgaris



B. arundinacea

Bambuseae

BAMBUSA Schreb.

(Latinized version of the Indian bamboo in turn possibly derived from the Malay, *mambu,* which may be a contraction of *rotan semanbu*, malacca cane)

Species ± 120, distributed in Eastern Asia, Australia, of which about 16 occur in India.

Genus distribution: Tropical and sub-tropical parts of the world.

Florets separated by rhachilla internode, or if 1-flowered then rhachilla extension present. Inflorescence tufted or stellate.

98. *DENDROCALAMUS*





Dendrocalamus strictus

Bambuseae

DENDROCALAMUS Nees.

(Gk *dendron,* tree; *kalamos,* reed. Culms tall and woody)

Species ~ 35, of which ~ 10 occur in India.

Genus distribution: India, Sri Lanka, to China and the Philippines and few other warm countries.

Florets arising at almost the same level and deciduous together, if 1-flowered then rhachilla extension absent; palea of sole or upper most floret rounded on back.



Melocanna baccifera (Roxb.) Kurz

Melocanna Trin.

Culms erect, arborescent. Rhizomes with elongated necks. Branches several to many per node, more or less equal. Culm leaves with persistent sheaths, with 1 to 2 strong undulations toward the apex, without auricles or fimbriae, the blade erect, at least proximally. Foliage leaves without auricles, with fimbriae, with or without obvious cross veins. Inflorescence elongate, the branches branched, bearing clusters of pseudospikelets. Pseudospikelets with 1 fertile flower plus several sterile flowers distally. Glumes 2 to 4, with buds in their axils. Paleas lacking keels. odicules 2.Stigmas 2 to 4. Pericarp fleshy, with an apical beak.

2 spp., eastern India to Burma.

VI. Subfamily: Pooideae

XV. Tribe: **Triticae**

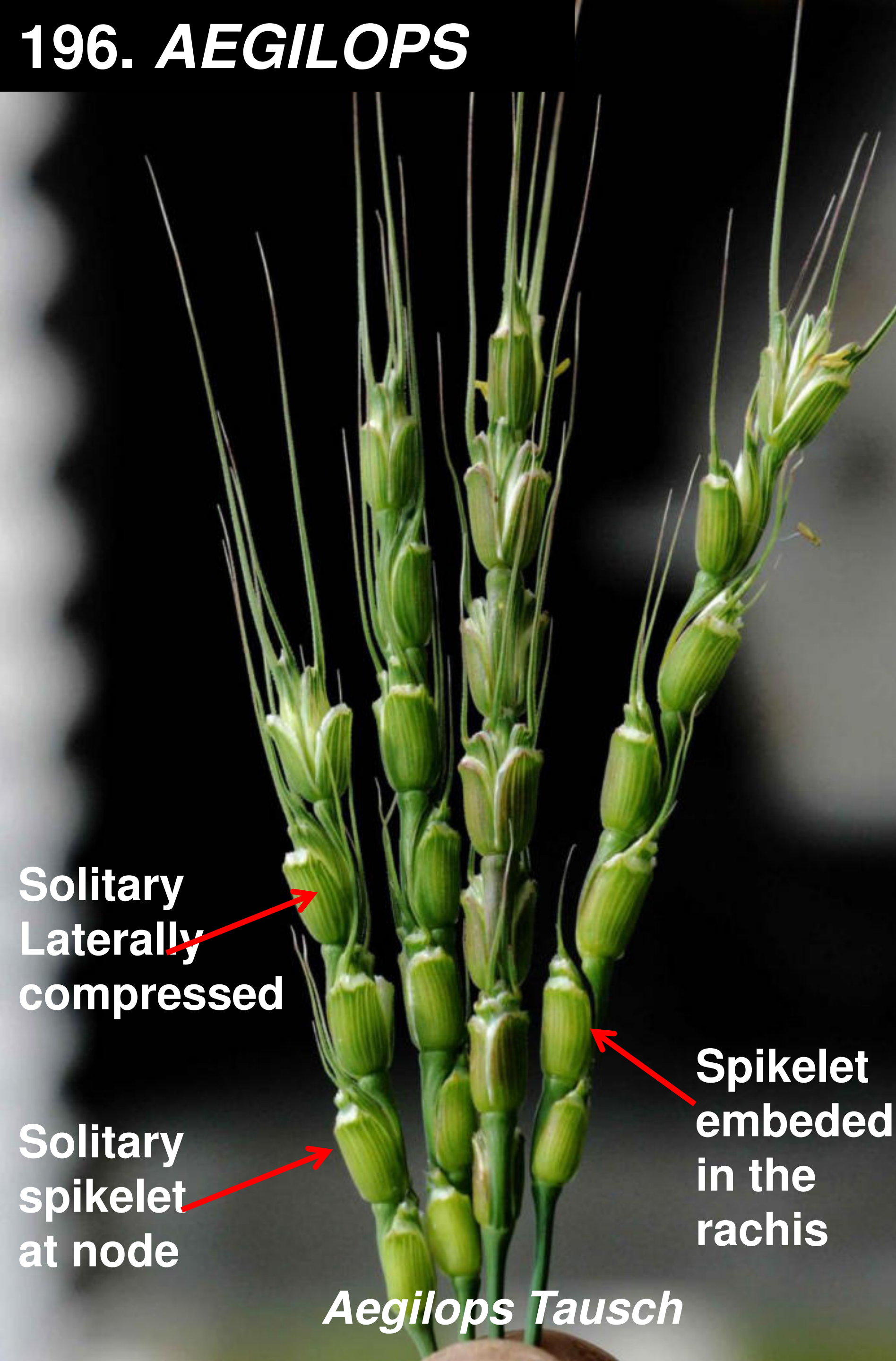
196. Aegilops

206. Hordeum

211. Secale

215. Triticum

196. *AEGILOPS*



Aegilops L.

Annuals. Leaves with falcate auricles. Inflorescence axis disarticulating at the nodes or not, or shed as a unit. Spikelets one per node, laterally compressed to terete, often partially embedded in the rachis, with 2 to 7 flowers. Glumes often with prominent veins, their apices truncate, toothed or awned, or awned only on the distal spikelets. Lemma apex toothed, awnless or with 1 to 3 awns.

2n = 14, 28, 42, 48.

Twenty-eight spp., Europe, Mideast, North America. Aegilops includes plants with genomes designated B, C, D, S, T, U, M, and N.

Annuals. spikelets one per node, laterally compressed to terete often partially embeded in the rachis with 2-7 flowers.
Species 28

215. *TRITICUM*

Triticeae

Spikelets on opposite sides of the rachis of solitary spikes or spike-like racemes, ovary hairy at apex, grain often longitudinally grooved



Triticum aestivum

TRITICUM L.

(The Roman vernacular name for wheat. Based on *tritum,* which in turn comes from *tero,* grind, because the grain is ground into flour)

Species 10-20.

Triticum

Genus distribution: East Mediterranean to Iran.

Spikelets on opposite side of the rhachis of solitary spikes or spike-like racemes; lemma 3-5 or more nerved; lodicules hairy.

VI. Subfamily: Pooideae

XVI. Tribe: **Poeae**

221. Avena

223, HELICTOTRICHON

227. Phalaris

230. Briza

233. Agrostis

246. Polypogon

266. Festuca

310. Poa

221. *AVENA*

A. ludoviciana ssp. sterilis



Avena sativa



- Panicle
- Spikelets with 2or more florests
- Glumes longer than florests
- Legule membranous

AVENA L.

(Latin name for oat possibly an allusion to *aveo*, desire, because it is sought out by cattle)

Species ± 25.

Genus distribution: Mainly Mediterranean & Middle East, extending to Northern Europe.

Lemmas awnless or awned from the back, rarely from the tip; awn usually kneed; ligules membranous. Spikelets nodding.

Spikelets in open or contracted or spikelike panicles in racemes or spikes, Spikelets usually with two or more fertile florests, or if one fertile floret then with sterile reduced florets above it, glumes usually as long or longer than lowest floret enclosing florets, lemma awnless or awned from back, legule membranous

223. *HELICTOTRICHON*





Helictrotrichon schimdii

HELICTOTRICHON Schult.

(Gk *helictos,*twisted; *thrix,* hair. The column of the lemma awn is twisted)

Species ± 100.

Genus distribution: Mainly Temperate Eurasia.

Spikelets erect; perennials; glumes 1-7 nerved.



PHALARIS L.

[Gk *phalaros,* coot. The phalaris of the Greeks was a grain enclosed in white scales thereby resembling the white frontal-shield on the head of a coot (*Fulica atra*)]

Species ± 15.

Genus distribution: Asia, Africa, Australia, Europe, USSR, North America, Newzealand.

Lower florets well developed or minute sometimes one absent, never transversely rugose or flanged, sometimes silky, golden brown to almost black.



POLYPOGON Desb.
(Gk *polys,* several; *pogon,* beard. Inflorescence bristly)

Species ~ 18, distributed in the temperate regions of the world, of which 2 occur in India.

Genus distribution: Temperate and tropical parts of the world.

Lemmas usually 3-5 nerved, frequently awned; glumes longer and firmer than the hyaline lemma or when the lemma is longer than the latter, indurated; grains usually with an adhering pericarp.

267. *LOLIUM*



Lolium temulentum

LOLIUM L.

[Referred to by the Roman poet, Virgil, as a troublesome weed, possibly darnell (*Lolium temulentum*)]

Species ~ 10 in temperate regions of the World, of which 4 species occur in India.

Genus distribution: Temperate Eurasia; Introduced elsewhere.

Upper glume well developed; spikes straight, simple or abnormally panicled, stout.

270. *DACTYLIS*



Dactylis glomerata

DACTYLIS L.
(Gk *daktylos,* finger. Inflorescence branches finger-like)

Species 1.

Monotypic Grass Genus

Genus distribution: Temperate Eurasia, introduced elsewhere.

Lemma acuminate: spinulose on keel; panicle secund, lobed.

310. *POA*



POA L.

(Gk *poa,* herb or grass. In Classical Greek, a word applied to grasses and other herbs useful for fodder. Other dialect spellings have also been employed, e.g., Ionic *poe and poie;* Doric, *poia)*

Species ± 15.

Genus distribution: Cool temperate regions throughout the world, extending through the tropics on mountain tops.

Spikelets borne in loose or contracted panicles; lemmas not awned.

310. *POA*



Poa vivipara (L.) Willd.

POA L.

(Gk *poa,* herb or grass. In Classical Greek, a word applied to grasses and other herbs useful for fodder. Other dialect spellings have also been employed, e.g., Ionic *poe and poie;* Doric, *poia)*

Species ± 15.

Genus distribution: Cool temperate regions throughout the world, extending through the tropics on mountain tops.

Spikelets borne in loose or contracted panicles; lemmas not awned.



Sclerochloa P. Beauv

Annuals, tufted. Leaves with sheaths closed ¼ to ½ of their length. Inflorescence unbranched and one-sided, sometimes the branches branched. Spikelets with 2 to 7 flowers, proximal rachilla internode noticeably thicker than the distal ones.Glumes shorter than the flowers, with hyaline margins, their apices obtuse to emarginate. Callus of flower glabrous. Lemma hardened, with 7 to 9 prominent veins, the apex obtuse. Base of style branches persistent in fruit, forming a beak.

2n =14.

Two spp., southern Europe and mid-East, weedy elsewhere.

Beaked fruits also appear in Duthiea, but have been acquired independently. S. dura (L.) P. Beauv. is widely introduced and weedy.

PACMAD Clade

Panicoideae, **A**ristidoideae, **C**hloridoideae, **M**icrairoideae , **A**rundinoideae, **D**anthonioideae

,,

VII. Subfamily: Aristidoideae

319. Aristida

320. Sartidia,

321. Stipagrostis,

319. *ARISTIDA*

Aristida



319. **Aristida** L.

Aristida L., Sp. Pl.: 82 (1753);
phylog.: Cerros-Tlatilpa et al. (2011).

•Annuals or perennials, mostly caespitose.

•Leaf apex often sharp-pointed.

•Ligule a fringe of hairs, or a fringed membrane.

•Glumes generally with one vein, their apices often mucronate or awned.

•Lemma awns often fused to form a twisted column.

•C4, NADP-ME subtype, except for A. longifolia.

•2n = 22, 24, 36, 44, 48, 66.

•Three hundred four spp., warm areas
•throughout the world.

•Cerros-Tlatilpa et al. (2011) find no evidence
•to support previously recognized subgenera in Aristida.

•Instead they identify several large clades that primarily reflect geography.



Aristida funiculata

Aristideae

3. ARISTIDA L.

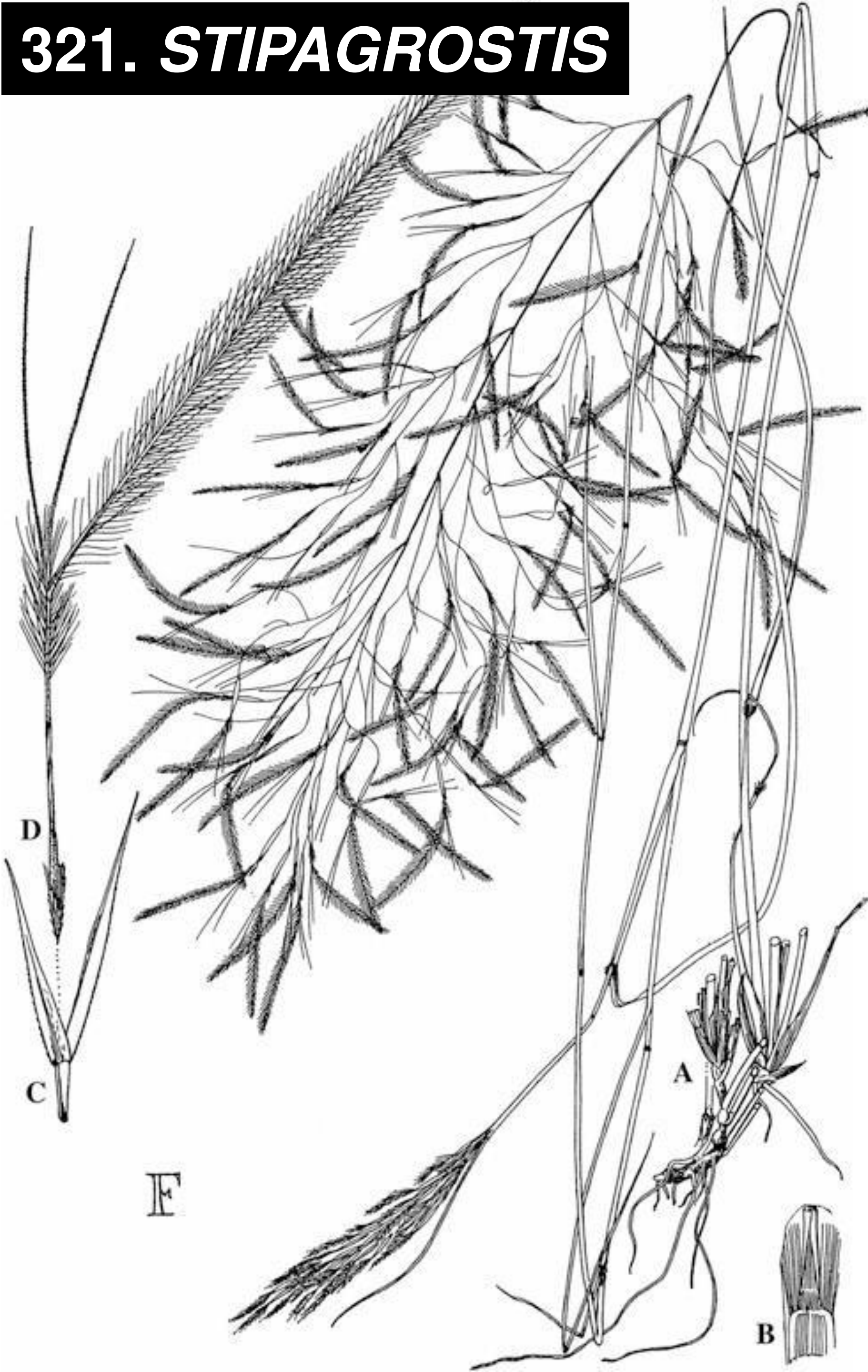
(Ancient Roman name for an awned Mediterranean grass)

Species ~ 250. Of which 16 occur in India.

Genus Distribution: Distributed in the tropics and subtropics of the world, usually in areas of poor dry soils with rainfall, in the warmer regions of the World Africa, America, Asia, Australia, Philippine Islands and U. S. S. R.

Lemmas indurated or rigid at maturity, terete or dorsally compressed; spikelets awned, awns trifid.

321. STIPAGROSTIS



321. **Stipagrostis** Nees Fig. 57
Stipagrostis Nees, Linnaea 7: 290 (1832); phylog.: Cerros-Tlatilpa et al. (2011).

- Annuals or perennials, caespitose, rhizomatous or stoloniferous, sometimes becoming somewhat woody at the base.
- Leaf blades inrolled, the apex often sharp-pointed.
- Ligule a fringe of hairs.
- Glumes with 1 to 9 veins, their apices emarginate to long attenuate, muticous to awned.
- Lemma awns deciduous, one or more plumose. C4, NADP-ME subtype.
- 2n=22, 44.
- Fifty-six spp., Africa to central and western Asia.
- Evidence that Stipagrostis uses NADP-ME as a decarboxylating enzyme is provided by Voznesenskaya et al. (2005a).

321. S

Aristida hirtigluma

PACMAD Clade

VIII. Subfamily: Panicoideae

323. Chandrasekharania

326. Jansenella

341. Centotheca

346. Arundinella

347. Garnotia



Chandrasekharania keralensis

CHANDRASEKHARANIA Nair

(The name is commemorative)

Species 1.

Genus distribution: Southern India

An anomalous 2-flowered genus somewhat resembling *Zenkeria*; but its papery brown spikelets, and leaf anatomy almost identical to *Jansenella*, suggest it may be better regarded as the most primitive member of Arundinelleae.

326. *JANSENELLA*



Jansenella griffithiana

JANSENELLA Bor

(L. *-ella,* diminutive here used as a name-forming suffix in honor of Pieter Jansen (1882–1955) Dutch agrostologist)

A monotypic grass genus.

Genus distribution: Burma, India and Srilanka.

Ligule a narrow arched membrane; upper lemma with a dense beard on each side below the lobes and about the middle; lobes produced into slender bristles.


326. JANSENELLA
Jansenella griffithiana

326. *JANSENELLA*



Jansenella griffithiana

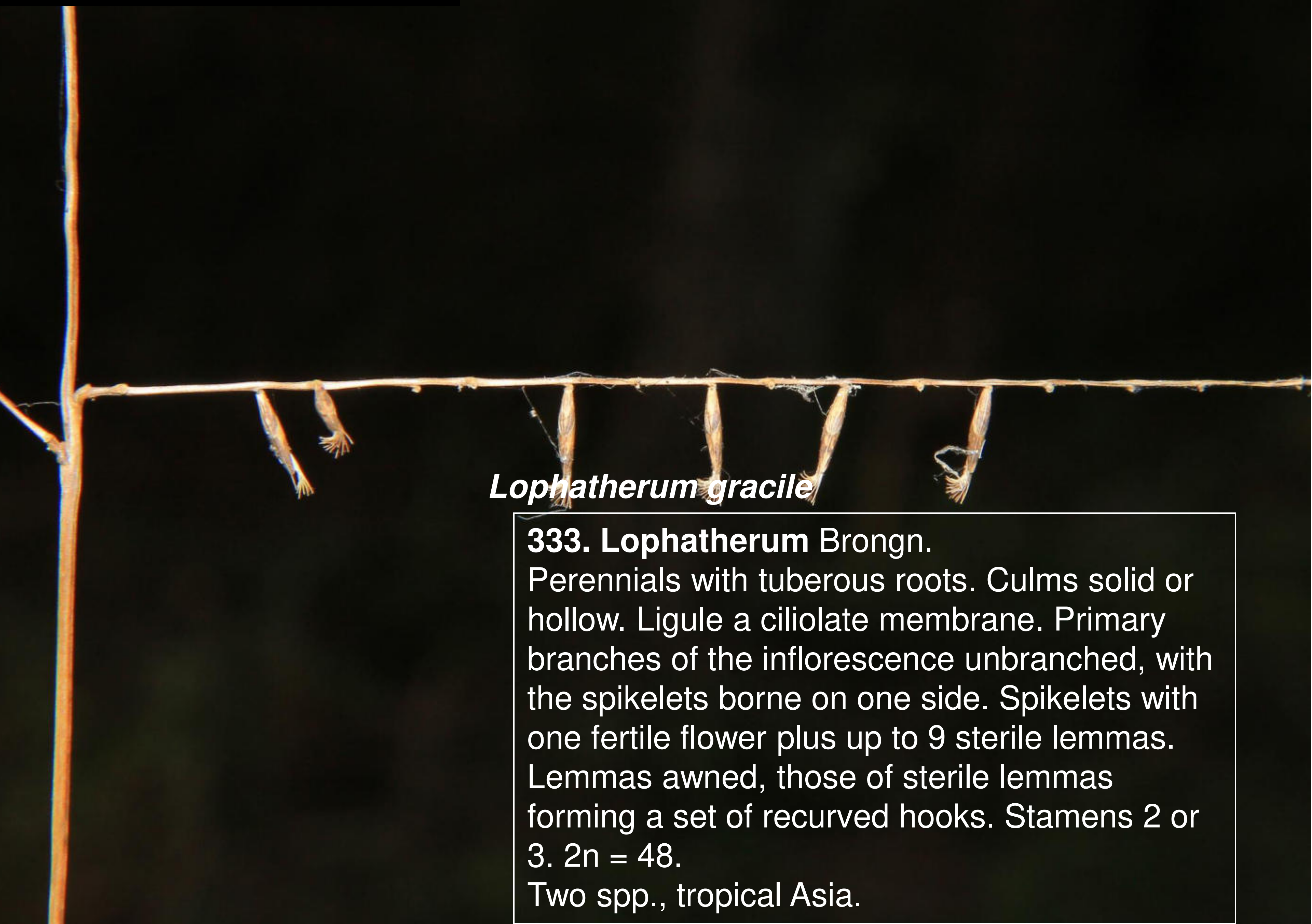


Jansenella neglecta





333. *LOPHATHERUM*



333. Lophatherum Brongn.
Perennials with tuberous roots. Culms solid or hollow. Ligule a ciliolate membrane. Primary branches of the inflorescence unbranched, with the spikelets borne on one side. Spikelets with one fertile flower plus up to 9 sterile lemmas. Lemmas awned, those of sterile lemmas forming a set of recurved hooks. Stamens 2 or 3. 2n = 48.
Two spp., tropical Asia.

333. *LOPHATHERUM*





337. *THYSANOLAENA*





Thysanolaena latifolia

THYSANOLAENA Nees
(Gk *thysanos,* fringe; *chlaena,* cloak. The upper lemma is markedly ciliate)

A monotypic grass genus.

Genus distribution: Tropical Asia and throughout India.

Lower floret empty and without a palea; glumes up to half the length of the spikelet; rhachilla produced beyond the upper floret and sometimes bearing an empty lemma; spikelets falling with part of the pedicel attached.



CENTOTHECA Desv.

(Gk *kenteo,* prick; *theke,* box. The lemmas bear long reflexed bristles)

A genus of ~ 3 species distributed in the tropics and subtropics of the world, of which one species occurs in India.

Genus distribution: North America, Australia, Burma, Bangladesh, Malaya, Malaysian Islands, Philippine Islands and Sri Lanka.

Lemmas not awned, at the most mucronate, often furnished with reflexed tubercle-based bristles on the margins.

346. *ARUNDINELLA*



Arundinella leptochloa

ARUNDINELLA Raddi

(L. *-ella,* diminutive, together with *Arundo*. The plants have the appearance of small reeds)

Species ~50, of which about 18 occur in India.

Genus distribution: Asia, Burma, Sri Lanka, Malaysia, Japan, Philippine Islands and USSR.

Glumes unequal, the lower acute, the upper acuminate; upper lemma awned with a perfect awn or at least a bristle.

346. *ARUNDINELLA*

ARUNDINELLA Raddi



Arundinella nepalensis A. metzii A. leptochloa A. cililata, A. species

A. purpurea A. pumila A. spicata A. setosa, A. tuberculata

347. *GARNOTIA*



GARNOTIA Brongn.

[In honor of Prosper Garnot (1794–1838) French surgeon-naturalist]

Species ~ 32, distributed in Asiatic and pacific regions of the world, of which 12 species occur in India.

Genus distribution: Tropical Asia, Polynesia and Queens land.

Spikelets cylindrical, falling entire; base of the glumes bearded; lemma awned.



APLUDA L.

(L. *apluda,* chaff or bran. The name was used by Pliny for a millet but may be a reference to the chaffy spathes left on the inflorescence after the spikelets have fallen)

A monotypic genus.

Tropical Asia

Genus distribution: Asia, China, India, E. tropical Malaya, Pacific Islands and Sri Lanka.

Raceme 1-noded, spathe boat shaped, glabrous hairy green or hyaline. Spikelets 3 per raceme, 1 sessile and 2 pedicelled. enclosed in a boat-shaped sheath.

2n=20,40

Spikelets in triads (one sessile and two pedicillate), pedicels flat and broad. One pedicillate spikelet staminate, the other vestigeal represented by solitary glume. Sessile spikelet with bulbous callus, lower glume winged on keel.



ARTHRAXON P. Beauv.

(Gk *arthron,* joint; *axon,* an axis. At maturity the inflorescence axis break into segments)

~ 27 species with over 20 varieties in the world and 25 species and 3 varieties in India.

Genus distribution: Distributed from Africa to Asia to Japan in the East and Australia in South-east.

Inflorescence of subdigitate, rarely single, slender racemes, terminal axillary not spatheate, sessile spikelet dorsally or laterally compressed: lower glume membranous to coriaceous, convex, with or without lateral keels, often spinulose upper lemma awned from low down on back.

2n= 18,20,36, 40.

Leaves broadly lanceolate with cordate base. Inflo-unbrached or digitate. both flowers of sessile spikelet usually lacking paleas. The awn abaxial, attached well below the midpont of the lemma.

349. ARTHRAXON

subtribe: Arundinellinae













351.CHIONACHNE

Lower glume of female spikelet hard, shining, surrounding the rachis



Chionachne koenigii

CHIONACHNE **R.Br.**

(Gk *chion,* snow; *achne,* scale. The lower glume is hard and white)

Species ~ 7, distributed from India to East Australia, of which 2 occur in India (*C. koenigii, C. semiteres*).

Genus distribution: South-East Asia, Australia and Polynesia.

Male and female spikelets in different parts of the same inflorescence. Fruit case open, lower glume of female spikelet hard, shining surrounding the rachis, not 3-lobed.

Chionachne, Sclerachne, Polytoca, Cyathorachis, Trilobachne


351.CHIONACHNE
(POLYTOCCA)

351.CHIONACHNE (POLYTOCCA)



351. *CHIONACHNE* (*TRILOBACHNE*)

female spikelet hard, shining, surrounding the rachis





Trilobachne cookei

TRILOBACHNE Schenck ex Henr.

(L. *tria,* three; *lobus,* lobe; Gk *achne,* scale. The lower glume of the female spikelet is trilobed)

A monotypic genus.

Genus Distribution: Central Asia and Australia.

Lower glume of the female spikelet hard, shining, surrounding the rachis, **3-lobed, the central lobe larger than the others.**

352. *CHRYSOPOGON*







Chrysopogon fulvus

CHRYSOPOGON Trin.

(Gk *chrysos,* yellow; *pogon,* beard. Most species have golden-yellow hairs at the base of the Spikelet)

48 species occur in the world and 14 in India.

Genus distribution: Distributed in warmer countries of the world, America, Asia, Europe, Malaya, Malaysian Islands and Philippine.

Inflorescence a raceme, sessile spikelet laterally compressed, raceme reduced to triads. Upper glume usually awned.

2n=20, 430.

(***Chrysopogon, Vetiveria***)

352. *CHRYSOPOGON*


C. velutinous


C. aciculatus


C. castaneus


C. gryllus


C. hackelii


C. lancearis


C. polyphyllus


C. fulvus

352. *CHRYSOPOGON* (*VETIVERIA*)







VETIVERIA Lem.-Lisanc.
(Tamil *vetti*, khus-khus; ver, root. The rhizomes possess an aromatic oil)

Species ~ 10, distributed in the tropics of the world, of which 2 occur in India.

Genus distribution: America, Africa and many parts of Asia and Java.

Spikelets compressed from the sides. Spikelets with many pairs of spikelets arranged in whorled racemes; lower glume tuberculate.

352. *CHRYSOPOGON*

Chrysopogon aciculata

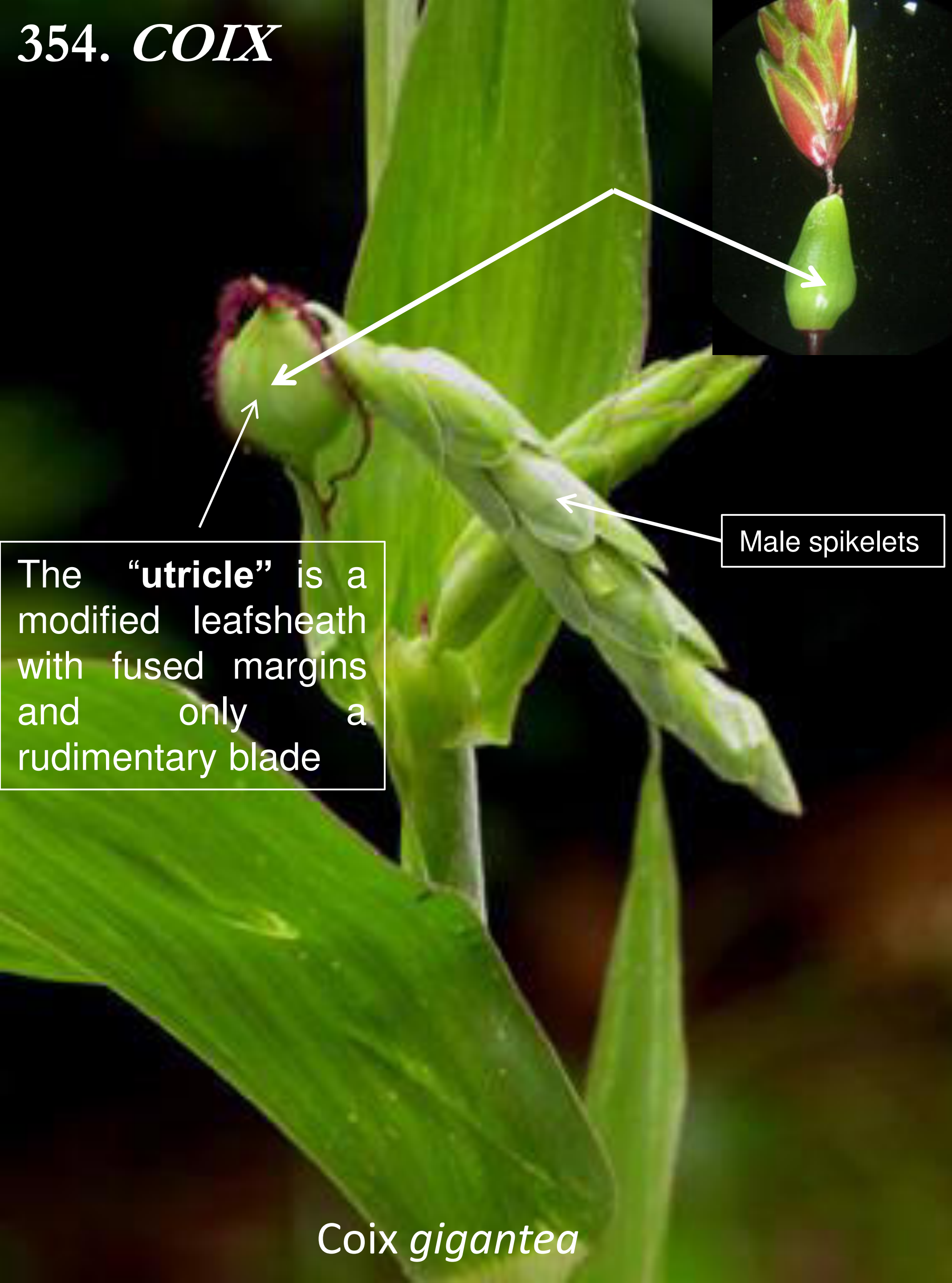
352. *CHRYSOPOGON*



352. *CHRYSOPOGON*







COIX L.

(Origin obscure, applied by Theophrastus to an unknown plant but possibly from Greek *koix* since the diaspores resemble the fruits of *Hyparrhenia coriacea*, the doum-palm)

Species ~ 4, distributed in the tropical Asia to Polynesia, of which 3 occur in India.

Genus distribution: Africa, Asia, Borneo, Burma, Java, Malaya, South America and Sri Lanka.

Male & Female flowers in different parts of the same inflorescence. Fruit case close, formed by leaf sheath.

2n= 10, 20, 40

354. *COIX*







355. *ELIONURUS*



ELIONURUS Humb. Et Bonpl. Ex Willd.

(Gk *eloios,* doormouse; *oura,* tail. The cylindrical inflorescence resembles the tail of a doormouse)

Species ~ 20, one occurs in India.

Genus Distribution: Africa, Arabia, America, Australia and Egypt.

Racemes covered with shaggy hairs. Lower glumes covered on the margins with bearded warty projections; all the sessile spikelets on one side of the rachis. 2n=10, 20.

Sessile spikelet bisexual, the lower glume with a bifid tip, with two keels with hairs in tufts on lines and an oil streak on the inner side of the keel, lower palea absent.
Unresolved position

356. *EUCLASTA*



Euclasta clarkei

EUCLASTA Franch.

(Gk *eu-*, well; *klastos*, broken in pieces. At maturity, the raceme freely falls apart as segments)

Species 2, both occur in India.

Genus distribution: Tropical America and Africa.

Joints and pedicels with a translucent longitudinal furrow. The lower 1-3 pairs of spikelets homogamous; racemes nodding; glumes never pitted.2n=40

357. *EULALIOPSIS*



EULALIOPSIS Honda
(Gk *opsis,* resemblance. Resembling *Eulalia*)

Species about 2 one occurs in India and also in Maharashtra.

Genus distribution: Widely distributed to Burma, Siam, China and Philippines.

Lower glume more or less flat, very shallowly depressed; pedicelled spikelet developed; upper lemma two-toothed, awned.

361. *LASIURUS*









Lasiurus scindicus

361. *LASIURUS*



Lasiurus scindicus

361. Lasiurus Boiss.
Perennials with short rhizomes. Ligule a fringe of hairs. Inflorescence unbranched or of digitate primary branches, the internodes clavate, with silky hairs. Spikelets in groups of three, two sessile and one pedicellate. Sessile spikelet callus pubescent, with a central peg. Lower glume of sessile spikelet two keeled, flattened on the back
with a short apical extension; upper glume thinner and boat-shaped. Lemma apex acute, without an awn.
2n = 18, 56.

Monotypic grass genus

E. Africa to NE India. Faruqi et al. (1987) note that the cytotypes of this species correlate with geography; plants with 2n = 18 are found in India and Pakistan, whereas those with 2n = 56 are in North Africa. No molecular data are available.

363. *POGONACHNE*



Pogonachne racemosa



POGONACHNE Bor

(Gk *pogon,* beard; *achne,* scale. The upper glume bears a conspicuous tuft of hairs)

A monotypic grass genus.

Genus distribution: India.

Spikelets solitary, pedicelled, forming a true raceme; the upper glume with a thick tuft of hairs from the middle

365. *SEHIMA*





Sehima nervosum

SEHIMA Forssk.

(Arabic *saehim.* The vernacular name in Egypt of the type species of the Genus)

Species ~ 7, distributed in the tropics of the old world, of which 4 occur in India.

Genus Distribution: Africa, Arabia and other warm countries, also in Australia and New Zealand.

Joints of the rhachis and the pedicel narrow, occasionally with a translucent longitudinal groove; sessile spikelet usually awned; lower glume of sessile spikelet without tuft of hair; ligule a row of hairs.

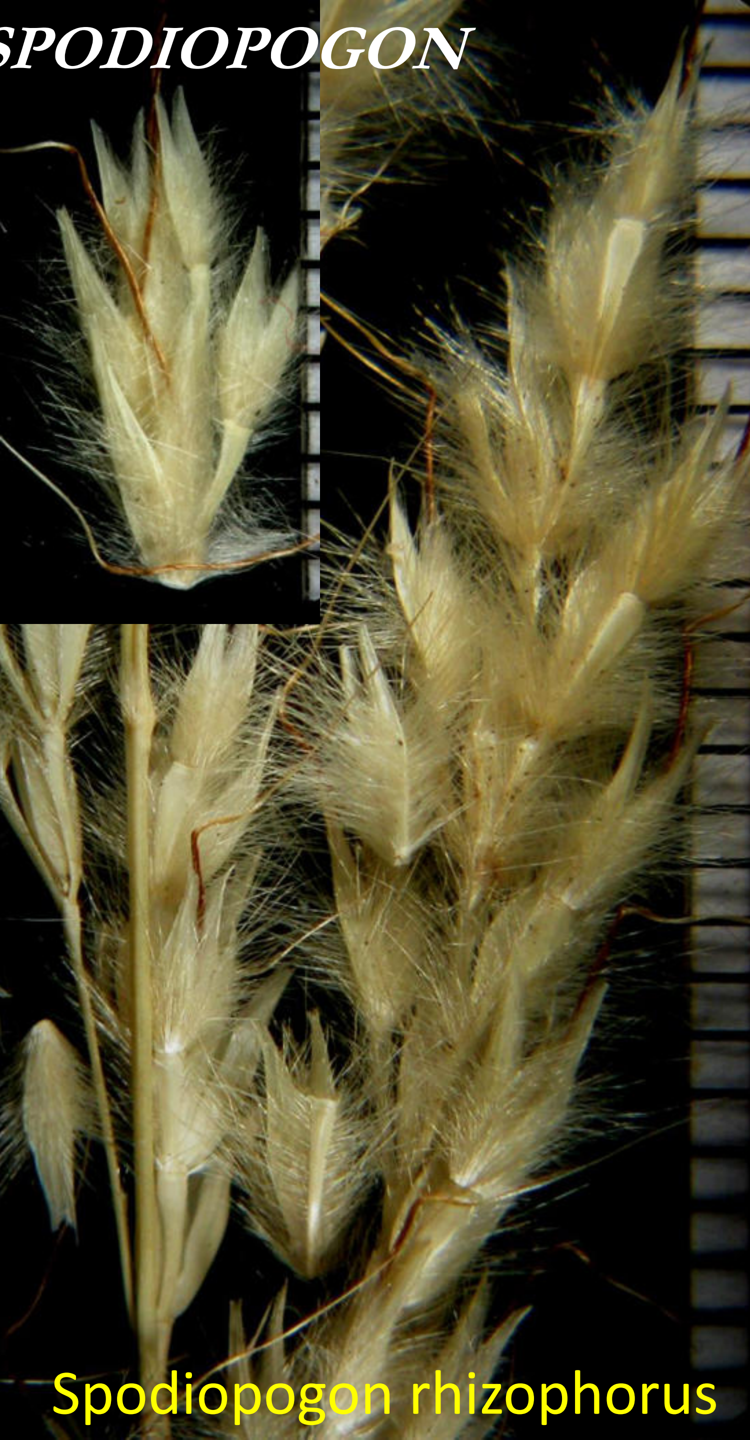
365. *SEHIMA*

365. ***Sehima*** Forssk.

Sehima Forssk., Fl. Aegypt.-Arab. 178 (1775).

Annuals or perennials, caespitose. Ligule a line ofhairs or fringed membrane. Inflorescence unbranched and curved, the spikelets embedded in the rachis; internodes and pedicels thickened, clavate. Sessile spikelet with the lower glume with two keels, the apex mucronate to awned; the upper glume membranous, green, awned, with rominent veins converging toward the apex; upper lemma awned from a sinus, the awn geniculate. Pedicellate spikelet staminate or sterile, trongly flattened, the callus fitting into a concave depression in the pedicel; glume with a terminal bristle.

2n = 34, 40. Five spp., Old World tropics.



SPODIOPOGON Trin.

(Gk *spodios,* grey; *pogon,* beard.The spikelets and pedicels are invested with long grey hairs)

Species ~ 10, distributed in Asia, of which 3 occur in India.

Genus distribution: U. S. S. R., several parts of Asia and Malaysian Islands.

Spikelets awned; upper lemma cleft; lower glume rounded on the back or two-keeled, with 5-9 prominent nerves.

367. *THELEPOGON*



THELEPOGON Roth. ex Roem. et Schult.

(Gk *thele,* wart; *pogon,* beard. The glumes are ornamented with short protuberances)

A monotypic grass genus.

Genus distribution: India, Tropical Africa and Burma.

Pedicelled spikelet reduced to a linear curved pedicel; lower glume coriaceous, convex, covered all over with transverse ridges which are often broken up into warts or teeth, not keeled.



TRIPLOPOGON Bor

(Gk *triploos,* triple; *pogon,* beard. There are three tufts of hair on the glumes)

A monotypic grass genus.

Genus distribution: India.

Inflorescence a terminal raceme; lower glume of sessile spikelet when young with two tufts of hair, upper glume with one tuft; ligule membranous.

373. *TRIPSACUM*

Fruit encased in the hard glume plus internode

Subfamily; Panicoideae
Tribe: Andropogoneae
Subtribe: Tripsacinae

Pistillate spikelets embeded in the internode, the nodes truncate with a central peg.

Tripsacum

TRIPSACUM L.

Gk *treis,* three; *psakas,* small pieces. The spikes break up into (at least) three pieces

Species 16.

Genus distribution: Southern USA to Paraguay, but mainly in Central America.

The fruit-case is formed partly by the lower glume and chiefly by the broad thickened internode or joint of the rhachis; male and female spikelets in the same spike, the male terminal; sheath not tessellately nerved.



Tripsacum dactyloides

373. Tripsacum L.

Tripsacum L., Syst. Nat. (ed. 10): 1253, 1261, 1379 (1759).
Perennials, caespitose or rhizomatous, 0.5–5 m
tall. Leaves without auricles, the ligule a fringed
membrane. Inflorescence branched or unbranched. Staminate spikelets with both
glumes on the abaxial side of the spikelet, overlapping.
Pistillate spikelets embedded in the internode, the node truncate, with a central peg.
Fruit encased in the hard glume plus internode.
2n = 36, 72, 90, 108.
Sixteen spp., North, Central and South America.

373. *TRIPSACUM*

Male spikelets

Female spikelets



Tripsacum andersonii



374. *ZEA*







ZEA L .

[Gk *zeia,* one-seeded wheat. Resembling one-seeded wheat (*Triticum monococcum*), or the genus *Zea* to which *Triticum* is unrelated]

Species 7. Mexico and central america.

Genus distribution: Cultivated in Warm countries of the world.

Male and female spikelets in separate inflorescence.

2n= 10, 20,

Zea, Euchlaena

374. *ZEA*



Subtribe- Rottbollinae

11 genera and 99 species

375. ***Eremochloa***
376. ***Glyphochloa***
377. ***Hackelochloa***
378. Jardinea
379. Loxodera
380. ***Manisuris***
381. ***Mnesithea***
382. Phacelurus
383. ***Rottboellia***

Hemarthria+ Heteropholis +Ophiuros+ Thaumastochloa

Pedicillate spikelet generally absebt or reduced, the pedicels somsible but always fused to the inflorescence axis. Sessile spikelet sunken in internode, producing a rat-tail inflorescence

384. ***Hemarthria***
385. Heteropholis
386. ***Ophiuros***
387. Thaumastochloa

\

375. EREMOCHLOA

Erimochloa muricata

375. *EREMOCHLOA*

tribe- Rottbollinae

2n=18 12 species, India, china, Southeast asia, Australia.

Inflo. axis flattened with clavate internodes.
Pedicellate spikelets rudimentary or reduced to awn only or lacking leaving a barren pedicel.
Sessile spikelet with the lower glume 2-keeled, setose.





GLYPHOCHLOA W. D. Clayton

(Gk *glypho,* carver; *chloa,* grass. Lower glume often elaborately Sculptured)

Species 9, the genus is endemic to Peninsular India.

Genus distribution: India.

Lower glume of sessile spikelet ornamented.

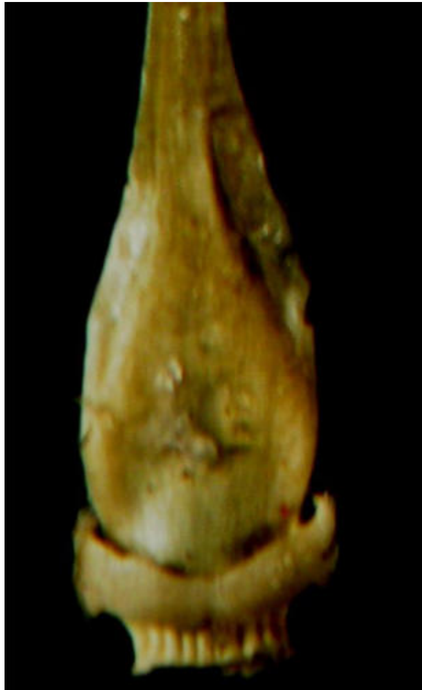
375. *GLYPHOCHLOA*


G. acuminata


G. divergens

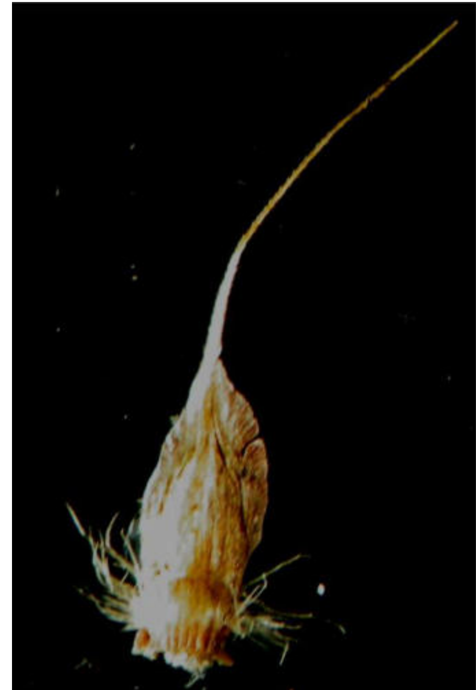

G. forficulata


G. goensis


G. henryi


G. mysorensis


G. ratnagirica


G. santapaui

375. *GLYPHOCHLOA*

Glyphochloa forficulata : diversity in lower glume ornamentation





377. *HACKELOCHLOA*





Hackelochloa granularis



MNESITHEA Kunth.

(In honor of Mnesitheos, 4th century b.c. Greek physician and writer on the subject of edible plants)

Species ~ 10 of which 7 occur in India

Genus distribution: Warmer Parts of the World.

Racemes mostly glabrous. Axis of the spikes fragile; sessile spikelets in pairs at each node of the axis.


377. HACKELOCHLOA
Hackelochloa granularis

380. *MANISURIS*



Manisuris myuros

MANISURIS L.

(Gk *manos,* necklace; *oura,* tail.The jointed racemes bear a fanciful resemblance to necklaces*)*

Species one.

Genus distribution: India.

Sessile spikelets strongly dorsally compressed, sunk in a cavity of the joint; lower glume with a broad wing on each keel, ridged perforated or sculptured.


380. MANISURIS
Mnesithea clarkii


380. *MANISURIS*
Mnesithea veldkampii Potdar, Gaikwad, Salunkhe & Yadav.

383. *ROTTBOELLIA*



Rottboellia cochinchinensis

ROTTBOELLIA L. f.

[In honor of Christen Friis Rottboell (1727–1797) Danish botanist]

Species ~ 4 distributed in the warm countries of the world of which 2 occur in India.

Genus distribution: Africa, America, East Asia, Australia, Burma, Europe, New Zealand, Pakistan, Philippine Islands and Sri Lanka.

Joints and pedicels fused; spikelets of each pair dissimilar, spikelets in opposite rows; lower glume of sessile spikelet entire at the tip.

383. *ROTTBOELLIA-COELORACHIS*





Coelorachis_khasiana



HEMARTHRIA R. Br.

(Gk *hemi-,* half; *arthron,* segment. The spikelets are sessile and embedded in the inflorescence axis which readily disarticulates into segments at maturity)

Species ~ 12, of which 4 occur in India.

Genus distribution: Africa and Asia.

Sessile spikelet not spherical in shape, spikelets similar; rhachis tough; joints and pedicel fused.

384. *HEMARTHRIA*



Hemarthria protensa

384. Hemarthria R. Br.

Perennials (one species annual), caespitose or stoloniferous.Ligule a fringe of hairs or a fringed membrane. Axillary branch complexes present. Inflorescence rachis internodes disarticulating
transversely or obliquely. Pedicellate spikelets bisexual or reduced. Sessile spikelets bisexual, glumes subulate tipped, not rugose, warty or pitted, lower glume hardened, upper glume membranous.

2n = 18, 20 (18 + 2B), 36, 54.

Fourteen spp.,

Old World tropics, maybe Americas.

386. *OPHIUROS*



Ophiuros bombaiensis

OPHIUROS Gaertn. f.

(L. *-ella,* diminutive but here used as a name-forming suffix. Resembling *Ophiurus*)

Species ~ 4, 3 occur in India.

Genus distribution: Australia, Asia and Africa.

Spikelets solitary, sessile, the pedicelled suppressed or rudimentary; pedicels fused to the internode (joint). Spikes cylindrical with the spikelets in opposite rows; lower floret usually ♂ with a well-developed palea.



OPHIUROS Gaertn. f.

(L. *-ella,* diminutive but here used as a name-forming suffix. Resembling *Ophiurus*)

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Spikelets solitary, sessile, the pedicelled suppressed or rudimentary; pedicels fused to the internode (joint). Spikes cylindrical with the spikelets in opposite rows; lower floret usually ⚦ with a well-developed palea.

389. *DIMERIA*









DIMERIA R. Br.

(Gk *dis,* twice; *meros,* part. Racemes occur in pairs)

Species ~ 45, distributed in tropics and subtropics, of which 28 occur in India.

Genus distribution: Eastern Asia, North America, Burma, Europe, Malaysian Islands, Malaya, Pacific Islands, Peninsula, Philippine Islands and Sri Lanka.

Spikelets solitary, almost sessile or shortly pedicelled, compressed laterally; rhachis of the racemes not jointed; tough, flat or filiform; glumes keeled. 2n=14

Spikelets solitary (not paired), on short pedicels, strongly laterally compressed, stamens 2. (Derived from within *Ischaemum apparantly by supression of sessile spikelet.*)


389. DIMERIA



ISCHAEMUM L.

(Gk *ischaemon*, styptic. The hairy spikelets of *Ischaemum* are reputed to staunch bleeding)

Species ~ 70, distributed in the tropical regions of the world mainly Asia, of which about 45 occur in India.

Genus distribution: Asia, America Philippine Islands, New Guinea, Australia and New Zealand.

Pedicelled spikelets developed; lower glume usually coriaceous below, often transversely wrinkled, furrowed or with nodules on the margins

390. *ISCHAEMUM*



I. mangluricum



I. tumidum



I. raizadae



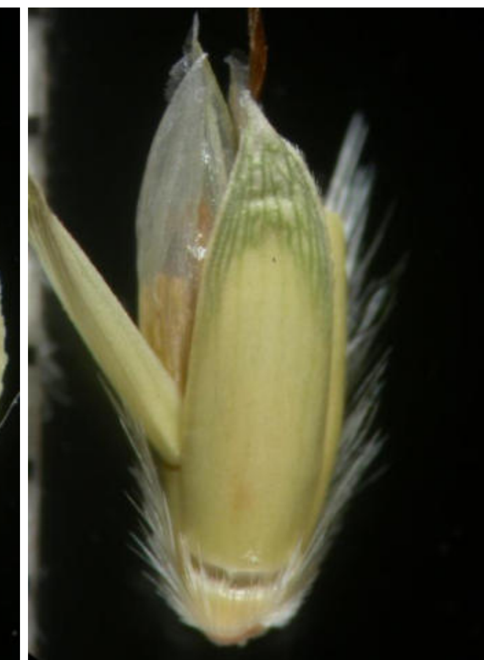
I. bolei



I. impressum



I. rugosum



I. santapaui



I. species

392. *CLEISTACHNE*

Spikelets unpaired. The pedicelled spikelet is generally inferred to have been lost resulting in unpaired spikelets

Cleistachne sorghoides Benth=C. stocksii

CLEISTACHNE Benth.

(Gk *kleistos*, to be locked away; *achne*, scale. The palea is very much reduced)

Species one, of which two occur in India.

Genus distribution: Africa and India.

Panicles 15-20 cm long, long peduncled, Spikelets solitary reduced to single sessile spikelet; sessile spikelet callus obtuse. Dark brown colored. Lower glume coriaceous, narrowly ovate, dark brown, densely hairy on dorsal side, apex truncate. Upper glume coriaceous, narrowly ovate, densely covered with brown hairs, apex acute.

2n=36.

396. *SORGHUM*


Sorghum deccanense


S. bicolor


S. halepense

SORGHUM Moench.

(Italian, *sorgho*. Vernacular name for the genus)

Species ~ 20.

Genus distribution: Cultivated all over the world.

Racemes very much less than 30 cm long, readily disarticulating; rhachis-nodes and pedicels ciliate; lower glume of sessile spikelet rounded on the sides, 2-keeled at tip; lodicules hairy.

The Saccharum group

Sessile and pedicillate spikelets similar, hermaphrodite; callus of the spikelet with long hairs, these are usually longer than glumes. Glumes papery to membranous, not indurate 9hard0

399. *Eriochrysis*
400. *Eulalia*
401. *Imperata*
402. *Lasiorhachis*
403. *Miscanthus*
404. *Saccharum*









400. *EULALIA* (Saccharum group)



EULALIA Kunth
(In honor of Eulale Delile (fl. 1825–1840) French artist and illustrator of Kunth's Révision des Graminées)

Species ~ 30, distributed in the tropical and subtropical regions, of which ~ 13 occur in India.

Genus distribution: Africa, Australia, Several parts of Asia, Malaya, Pacific Islands, Philippine and New Zealand.

Upper lemma cleft, awned in the cleft; lower glume 2-keeled, depressed between the keels; spikelets in pairs; racemes two or more; upper glume not awned, or if awned, awn not more than 3mm long.



IMPERATA Cyr.

[In honor of Ferrante Imperato (1550–1625) an apothecary from Naples]

Species ~ 10, distributed in warm temperate regions of the world of which 2 occur in India.

Genus distribution: Tropical and Sub tropical parts of the world.

Lemmas unawned. Panicles narrow, narrow, contracted, silvery; glumes very delicate; callus-hairs twice as long as the glumes or more.

404. *SACCHARUM*



Saccharum spontaneum

SACCHARUM L.

(L. *saccharum,* sugar. Some species are cultivated for their sugar content)

Species ~ 30-40, of which 13 occur in India.

Genus distribution: Africa, America, Asia, Europe, Malaysian Islands, Philippine, Pacific and West Indies.

Rhachis of the racemes breaking up; spikelets unawned; culm solid; panicle ample; spikelets similar.

404. *SACCHARUM-ERIANTHUS*



ERIANTHUS Michx.

(Gk *erion*, wool; *anthos*, flower. The subtending glumes are covered with long hairs)

Species 28. (37 spp.)

Genus distribution: Almost cosmopolitan.

Rhachis of the racemes breaking up; spikelets awned. Upper lemma not cleft or shortly 2-toothed; lower glume 2-keeled with infolded margins.

2n=40,60,68, 76,77,78,80,90,46-128, 110,112, 117-117,144.

Saccharum, Erianthus

The generic limits of Saccharum, Erianthus and Miscanthus are not clear.

(*Saccharum, Erianthus, Miscanthus, Narenga, Sclerostachya)*

406. APOCOPIS

Andropogoneae

3. APOCOPIS Nees

(Gk *apo-*, separate; *kopis*, meat cleaver. The sessile spikelet is truncate)

A genus of ~ 16 species, Tropical Asia distributed in the eastern Asia of which ~ 5 species occur in India.

Genus distribution: China, Indo-Malaya and Sri Lanka.

Spikelets paired. Inflorescence of single or subdigitate racemes. Lower glume broadly truncate; pedicelled spikelet much reduced.

2n=20, 40

Pedicelled spikelet present an poorly developed or absent and respresented by only pedicel; pedicel fused to the lower glume of the sessile spikelet. Sessile spikelet with a pubescent callus; glumes with strong parallel veins, some times winged.

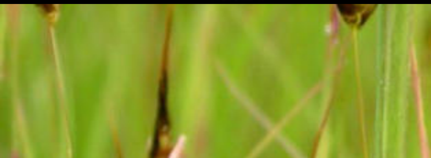




Apocopis mangalorensis

408. *LOPHOPOGON*









Lophopogon tridentatus

LOPHOPOGON Hack.

(Gk *lophos,* crest; *pogon,* beard. Upper glume awned and hairy at its apex)

Species ~ 3, distributed in India and Australia.

Genus distribution: Australia and India.

Racemes two or more; upper glume with a very short awn; lower glume of fertile spikelet with transversely placed tufts of hairs; sessile spikelet male, the pedicelled hermaphrodite.

408. *LOPHOPOGON*

408. ***Lophopogon*** Hack.

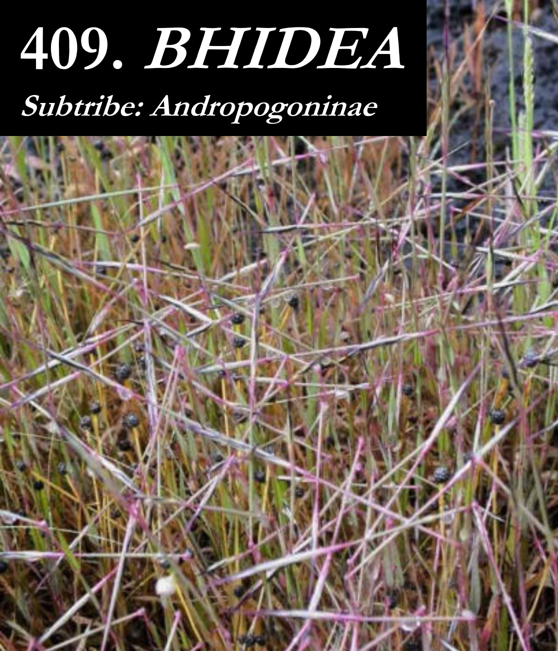
Lophopogon Hack., Die Nat. Pflanzenfam. II, 2: 26 (1887).

Annuals or perennials, caespitose. Ligule a fringed membrane. Inflorescence with 2 branches appressed to form an ovate head. Sessile and pedicellate spikelets similar, overlapping, the distal ends of the internodes oblique. Proximal spikelet pairs with both sessile and pedicellate spikelets staminate. Glumes stiff, truncate, the apex with three teeth; lower glume with distinct hair tufts, upper glume awned.

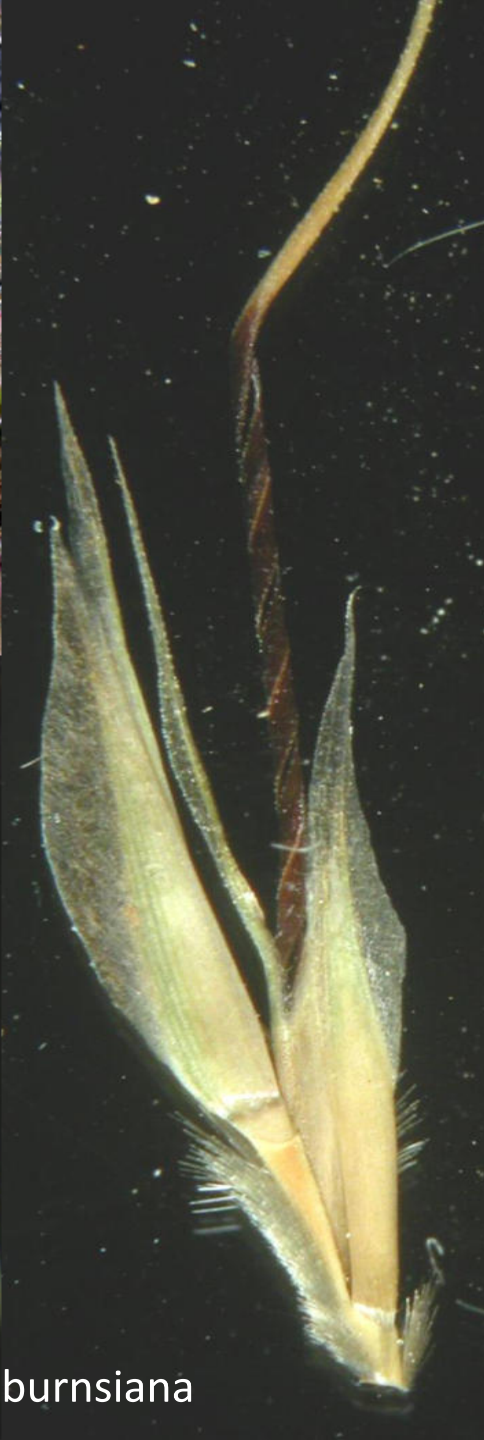
Two spp., India.

409. *BHIDEA*

Subtribe: Andropogoninae







Bhidea burnsiana

BHIDEA Stapf ex Bor

(In honor of R. K. Bhide (fl. 1919) Economic Botanist, Poona, India)

Total 3 species.

Genus distribution: India

Lower glume flat, laterally 2-keeled, keels large asymmetrical membranous wings; upper glume trilobed, central produced into a long tail. Upper lemma 2-lobed or 2-cleft and awned from sinus. Pedicelled spikelet large, with small square callus, the lower glume asymmetrically winged.

. CYMBOPOGON

e: Andropogoninae



Cymbopogon martinii



CYMBOPOGON Spreng.

(Gk *kymbe,* boat; *pogon,* beard. In most species, the hairy spikelets project from boat-shaped spathes)

Species ~ 60, distributed mostly in the warmer regions of the world, of which 25 occur in India.

Genus Distribution: Tropical and sub Tropical countries

Aromatic grasses; racemes in pairs supported by spathes, often collected into huge panicles one pair of spikelet in each raceme homogamous, male or neuter, all other pairs heterogamous.

2n=20,22,40,60.

Leaves aromatic. Inflo- a pair of strongly reflexed branches, one slightly longer than other, the lowerone with a pair of staminate spikelets at its base. floers lacking paleas.

420. *HETEROPOGON*







HETEROPOGON Pers.

(Gk *heteros,* different; *pogon,* beard. The lemma of the hermaphrodite floret has a well developed awn in contrast to the setae developed on the awns of the male florets)

Species ~ 12, of which 7 occur in India.

Genus Distribution: Tropical and subtropical regions of the world.

Racemes straight or very slightly curved; glumes often garnished with tubercle-based bristles; lower glume of sessile spikelet terete, grooved or not on the back, usually covered with short hairs.







ISEILEMA Anderss.

(Gk *isos,* equal; *eilema,* covering. The involucral male spikelets surround and so protect the central hermaphrodite spikelet)

Species about 28, of which 6 occur in India and 2 in this region.

Genus Distribution: Distributed in Tropical Asia and Australia.

Involucre of four 1-flowered or sterile spikelets, involucral spikelets pedicellate, deciduous.

423. *THEMEDA* 421. *ISEILEMA* Spikelets in group

S

Involucral spikelet

Themeda

Pedicelled spikelet

P P

Sessile spikelet

S

1 2 3 4

Sheath

Iseilema

422. *PSEUDODICHANTHIUM*





PSEUDODICHANTHIUM Bor

(Gk *pseudos,* false. Dicanthium Gk *dicha,* in two; *anthos,* flower. Inflorescence with two kinds of spikelet, hermaphrodite and male or neuter)

A monotypic grass genus.

Genus distribution: India.

Racemes markedly curved; glumes glabrous; lower glume of the sessile spikelet keeled and broadly winged, glabrous.



THEMEDA Forssk

(Arabic *thamada,* depression filled with water after rain. Transliterated by the author as *thaemed*. The reason for the choice of name not given by author)

Species ~20, of which 19 occur in India.

Genus distribution: Warm regions of the World.

Involucre of four 1-flowered or sterile spikelet. Involucral spikelets sessile, not deciduous; callus of the fertile spikelets pointed.

423. *THEMEDA*

Spikelets in group

Pedicelled spikelet

P

P

Sessile spikelet

S

1

2

S

3

4

Involucral spikelet

Themeda

Iseilema

Sheath

424. *CAPILLIPEDIUM*

Capillipedium Stapf

Annuals or perennials, caespitose. Leaves generally without auricles. Ligule membranous, a fringed membrane, or a fringe of hairs. Inflorescences delicate and open, the slender branches themselves branched. Inflorescence internodes and pedicels of pedicellate spikelets with two strong marginal veins and a hyaline groove, often described as a “translucent line”, between. Each branch with a long naked proximal portion and fewer than eight pairs of spikelets. Pedicellate spikelets staminate or sterile. Sessile spikelets with a pubescent callus, both flowers generally lacking paleas.

2n = 20, 40, 60.

Eighteen spp., Africa, Asia and Australia.

425. *BOTHRIOCHLOA*

Bothriochloa Kuntze

Perennials, caespitose or rhizomatous. Ligule membranous or a fringed membrane. Inflorescence with digitate primary branches, or the branches borne on an elongated axis, each branch with 8 or more pairs of spikelets. Inflorescence internodes and pedicels of pedicellate spikelets with two strong marginal veins and a hyaline groove, often described as a "translucent line", between. Pedicellate spikelets staminate or sterile. Sessile spikelets with a pubescent callus, the lower glume often with a deep circular pit in the center, with two keels.

2n = 20, 30, 40, 50, 60, 120.

Thirty-seven spp., tropical.

The number of spikelets per inflorescence branch is not distinctive within the Andropogoneae, but does distinguish *Bothriochloa* from *Euclasta* and *Capillipedium*

426. *DICHANTHIUM*

D. caricosum







D. caricosum

DICHANTHIUM Willemet

(Gk *dicha,* in two; *anthos,* flower. Inflorescence with two kinds of spikelet, hermaphrodite and male or neuter)

Species ~30 of which 24 occur in India and in Maharashtra.

Genus distribution: Africa, Australia, Pacific Island and many parts of Asia.

All spikelets, both sessile and pedicelled in the racemes more or less alike; glume herbaceous, greenish.2n=20,40,50,60.



PSEUDANTHISTIRIA (Hack.) Hook.f.

(Gk *pseudos,* false. Anthistiria is derived from Gk *anthos,* flower; *steira,* forepart of a ship's keel. The spathes subtending each cluster of spikelets resembles the prow of a ship)

Species 5, distributed in tropics and subtropics of the world, of which 4 occur in India.

Genus distribution: Burma, Sri-Lanka and Thailand.

Racemes solitary at the ends of the branches supported by spathes, but sessile spikelets not overlapping. Racemes with two fertile spikelets; lower glumes not pitted.



Diectomis fastigiata

DIECTOMIS Kunth

(Gk *dis,* twice; *ectemon,* castrate. Two of the spikelets in each cluster of three are sterile. The name has been given to two Genera)

A Monotypic grass genus.

Genus distribution: Africa, Tropical America, Burma and China.

Pedicelled spikelets very much larger than the sessile one; lower glume flat, papery, reddish, awnedupper glume awned; joints and pedicels bucciniform.



ANDROPOGON L.

(Gk *aner,* man; *pogon,* a beard. The pedicels of many species are invested with long hairs)

Species ~ 122 of which 9 occur in India.

Genus distribution: Mostly in the tropics of both hemispheres. Africa, America, Asia, Australia, Malaya, Malaysian Islands and Philippine Islands.

Inflorescence of racemes, racemes paired, digitate, 1–2 cm long, deciduous from 4 toothed stipes. The copper colored bi-nate raceme makes it distinguishable in fields.

2n=20,40,60,100,120,180.

`433. *SCHIZACHYRIUM*



Schizachyrium paranjpyeanum

SCHIZACHYRIUM Nees

(Gk *schizo,* split; *achyron,* chaff. The upper lemma is deeply bilobed)

Species ~ 50, distributed in the tropics of the world, of which 6 occur in India.

Genus distribution: Tropical parts of Asia, Africa and America.

Upper lemma of the sessile spikelet 2-lobed or 2-cleft, awned in the sinus. Pedicelled spikelet often small to very small; upper glume awnless joint and pedicels clavate, 2-toothed.



Hymenachne acutigluma

Paniceae

HYMENACHNE P. Beauv.

(Gk *hymen,* membrane; *achne,* scale. The fertile lemma is membranous)

A genus ~ 8 species distributed in the tropics of the world of which 2 species occur in India.

Genus distribution: Central Asia, Burma, Bangladesh, Malaya, Malaysian Islands and South America.

Spikelets usually arranged in cylindrical spike-like panicles; upper glume inflated or not. Upper lemma and palea membranous, gaping at apex; spikelets lanceolate.

453. *AXONOPUS*



Axonopus compressus (syn. *Axonopus compressus* (Sw.) P.Beauv. var. *australis* G.A.Black, *Milium compressum* Sw., *Paspalum compressum* (Sw.) Nees, *Paspalum platycaule* Willd. ex Steud., *Paspalum platycaulon* Poir.) is a species of grass.

It is often used as a permanent pasture, groundcover, and turf in moist, low fertility soils, particularly in shaded situations.

It is generally too low-growing to be useful in cut-and-carry systems or for fodder conservation.

While not optimal, it is occasionally used for football fields especially those which are not for elite competitions or where only a low level of maintenance can be done.

462. *PASPALUM*





Paspalum canarae var. canarae



P. scrobiculatum



P. distichum

PASPALUM L.

(Gk *paspalos*, a kind of millet mentioned by Classical authors)

Species ~ 250, distributed in the tropical regions, of which ~ 12 species occur in India.

Genus Distribution: Asia, Europe, Malaya, Pacific Islands and U. S. S. R.

Lower glume usually absent; spikelets planoconvex.

467. *ECHINOCHLOA*



ECHINOCHLOA P. Beauv.

(Gk *echinos,* hedgehog; *chloa,* grass. The glumes are often awned and the inflorescence congested, thereby resembling a hedgehog)

Species ~ 20, distributed in warmer regions of the world, of which 7 occur in India.

Genus Distribution: Africa, South America, Asia, Malaya and Malaysian Islands.

Glumes acuminate or awned, rarely only acute; upper lemma not mucronate. Leaf blades linear; racemes dense; culms erect or suberect.

473. *PANICUM*



PANICUM L.

(L. *panis,* bread; *-icum,* belonging to. In Roman times the vernacular name of the grass used for making bread)

Species about 600, distributed in the tropical and subtropical regions of the world, of which 55 occur in India.

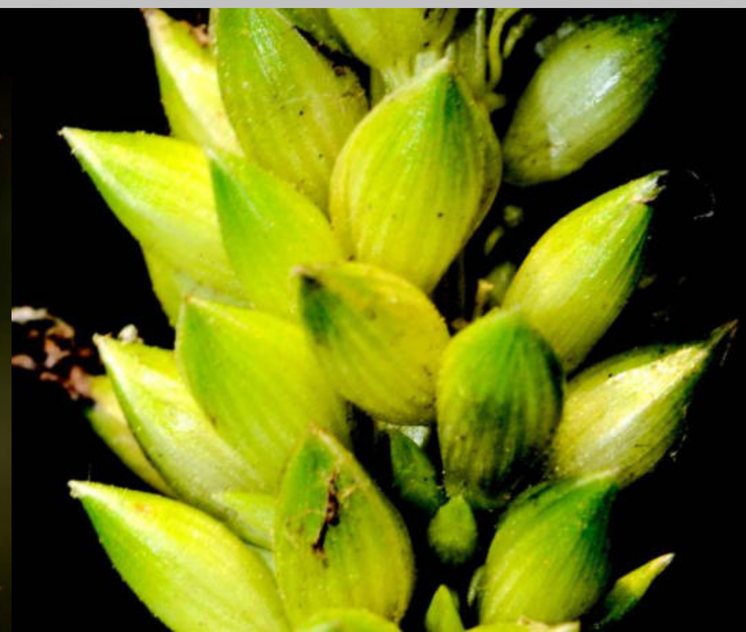
Genus distribution: Europe, Africa, Asia, America, Australia, Japan, Java, Philippine and many other countries

Fertile floret without lateral basal appendages or scars. Upper glume as long as the spikelet.

474. *SACCIOLEPIS*







479. *DIGITARIA*

Digitaria ciliaris





DIGITARIA Heist. ex Fabricus

(L. *digitus,* finger; *-aria,* pertaining to. The ultimate inflorescence branches are often finger-like. The name has been applied to three distinct genera)

Species ~ 230, distributed in the tropical and temperate regions of the world, of which ~ 28 occur in India.

Genus distribution: Tropical parts of the World.

Lemma of the upper floret thinly cartilaginous, usually with flat hyaline margins; spikelets awnless.

482. *TRACHYS*



Trachys muricata

Paniceae

21. TRACHYS Pers.
(Gk *rough.* Inflorescence branches tipped with recurved spines)

Species 4

Genus distribution: India.

Inflorescence of 1-3 racemes each consisting of a broad, flat and disarticulating rhachis, bearing on the under surface of each joint shortly peduncled clusters of 1-6 spikelets mixed with small scale-like glumes.

482. *TRACHYS*

Key to the species of *Trachys*

1. Clusters of spikelets two or three at each rachis internodes…………….….….….2

1. Cluster of spikelets single at each rachis internodes…….…...………………...…...3

2. Clusters of spikelets three; sterile lemmas broadly ovate………………*T. muricata*

2. Clusters of spikelets two; sterile lemmas lanceolate………………..*T. narasimhanii*

3. Leaves tomentose; all spikelets glabrous ……….…………….……..….…*T. copeana*

3. Leaves glabrous; pedicelled spikelets hairy…………….………........….*T. deccanensis*





Paniceae

1. ACROCERAS Stapf

(Gk *akros,* at the tip; *keras,* horn. The upper subtending glume and sterile lemma each contract into a horn-like Structure)

Species ~ 15, distributed in the tropics and subtropics of the world, of which ~ 3 species occur in India (*A. tonkinenese, A. zizanioides and A. munroanum*).

Genus distribution: Africa, America, Bangladesh, Burma, China, Malaya, Malaysian Islands and other warm countries.

Spikelets dorsally compressed or almost terete; glumes and lemmas with laterally compressed and thickened apices.



Alloteropsis cimicina

Paniceae

2. ALLOTEROPSIS J. S. Presl ex C. B. Presl

(Gk *allotrios,* belonging to another; *opsis,* appearance. The spikelets and inflorescences somewhat resemble those of *Panicum*)

A genus of ~ 4 species distributed in the tropics and subtropics of the old world, of which 2 species occur in India.

Genus distribution: In the tropics and the warm Temperate Zone of the old world, two in India and one in Maharashtra.

Lemma of the upper floret thinly cartilaginous, usually with flat hyaline margins; spikelets awned.



484. ***Alloteropsis*** J. Presl

Alloteropsis J. Presl, Reliq. Haenk. 1(4–5): 343, pl. 47 (1830).

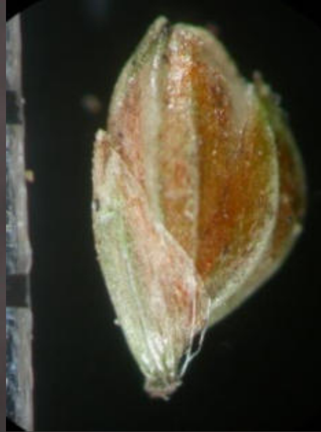
Perennials. Ligule a fringe of hairs or a fringed membrane. Inflorescence of unbranchedbranches, the spikelets borne on one side. Spikelets clustered on the branches. Lower glume much smaller than the upper one. Proximal lemmas with or without awns, distal lemmas awned. C3 and C4. 2n= 18, 54.

Five spp., Old World tropics.

Alloteropsis is monophyletic, and the C3 pathway in this group is derived (GPWG II 2012; Ibrahim et al. 2009).

487. CYRTOCOCCUM









Cyrtococcum oxyphyllum

Paniceae

4. CYRTOCOCCUM Stapf

(Gk *kyrtos*, bent; *kokkos*, kernel.The mature spikelet is asymmetric in outline)

Species ~ 12, distributed in paleotropic regions, of which 7 occur in India.

Genus distribution: America, Australia, Bangladesh, Bhutan, Burma, China, Europe, Malaya, Malesian Islands, Philippine Islands, Pacific Islands and Sri Lanka.

Spikelets falling singly, not subtended by bristles. Spikelets arranged in open or contracted panicles. Spikelets distinctly gibbous and laterally much compressed.

492. *OPLISMENUS*

Oplismenus burmanii

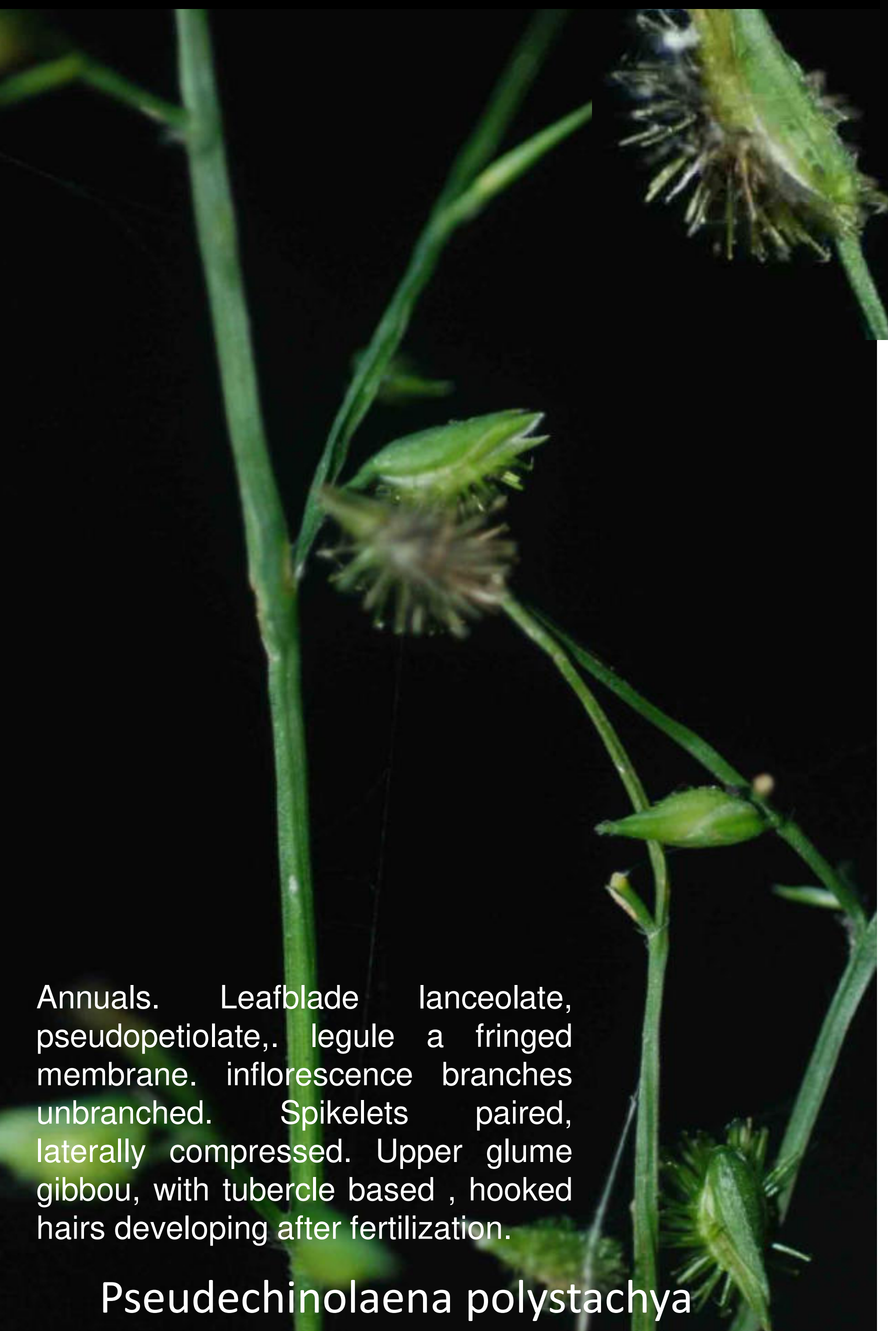
Paniceae

9. OPLISMENUS P. Beauv.
(Gk *hoplismenus*, bearing arms. Glumes and sterile lemmas awned)

Species ~ 5, distributed in the tropical parts of the world, of which 3 occur in India.

Genus Distribution: Africa, America, Australia, Burma, East and West Asia, Malaya, Malaysia, New Zealand, Philippine, Pacific Islands, West Indies and Europe.

Leaf blades lanceolate to ovate; racemes loose to moderately dense; culms creeping and ascending.



Paniceae

14. PSEUDECHINOLAENA (Hook. f.) Stapf.

(Gk *pseudos,* false; Gk *echinos,* hedgehog; *chlaena,* cloak. The lower glume bears numerous acute or shortly barbed bristles)

Species:61.

Genus distribution: Hills of Esatern india. Khasi & Naga Hills, madras state, Ceylon, South-east Asia, tropical regions of both hemispheres

Spikelets laterally compressed, obliquely ovate; upper glume boat shaped, with rows of glands or hooked hairs or bristles between the nerves

496. *PSEUDECHINOLAENA*

Pseudechinolaena polystachya (H.B.K.) Stapf.


496. PSEUDECHINOLAENA



Paniceae

3. CENCHRUS L.

(Gk *kegchros*, a classical Greek name for *Panicum miliaceum* or any plant with small grains)

Species ~ 25, 7 occur in India.

Genus Distribution: Africa, America, Australia, Europe, Mediterranean regions and other Warm countries.

Involucre of spines or rigid bristles united at the base into a hard cup.

501. *CENCHRUS+ PENNISETUM*

Cenchrus ciliaris

501. *CENCHRUS+ PENNISETUM*

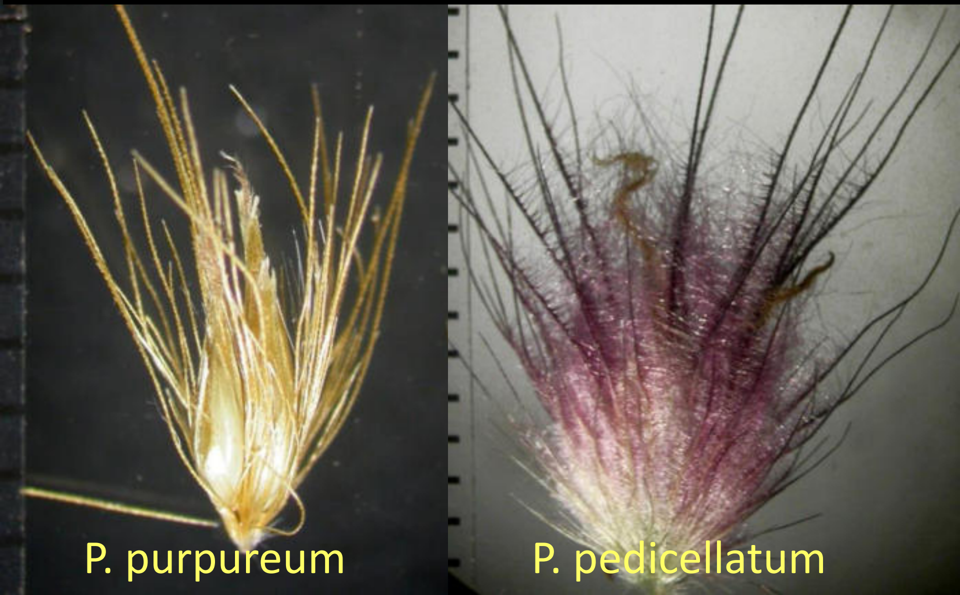

Cenchrus biflorus


C. ciliaris


C. setigerus


C. echinatus

501. *CENCHRUS+ PENNISETUM*





Paniceae

13. PENNISETUM L.C.Rich.
(L. *penna,* feather; *seta,* bristle. The spikelets of most species of the genus are subtended by plumose bristles)

Species ~ 75, distributed in the tropical and subtropical parts of the world, of which 15 occur in India.

Genus distribution: Africa, America, Asia, Australia, Europe, Malaysian Islands, Philippine Islands and West Indies.

Lemmas homomorphous; lower often 3-lobed; upper shorter, shining; upper floret readily disarticulating; rhachis with decurrent wings below the insertion of the pedicels.


501. CENCHRUS+ PENNISETUM

506. *PANICUM*



Panicum antidotale

Panicum antidotale Retz. English: **blue panicgrass**) is a tall (up to 3 metres), coarse, woody perennial grass throughout the Himalaya and the Upper Gangetic Plain and specifically in various regions of the Indian state of Punjab and the Pakistan province of Punjab and the neighbouring areas of these regions. The plant has strong spreading rhizomes.

510. *PSEUDORAPHIS*



Pseudoraphis spinescens

Paniceae

15. PSEUDORAPHIS Griff.

(Gk *pseudos*, false. *Rhaphis* Gk needle. The fertile spikelet bears a needle-like callus)

Species ~ 10, in tropical Asia and Australia, of which 3 occur in India.

Genus distribution: Australia, India, Japan, Sri Lanka, and other warmer countries.

Upper lemma smooth; bristles caducous, solitary, formed by the prolongation of the branch beyond the terminal spikelet.

2n=16



Paniceae

18. SETARIA P. Beauv.

(L. *seta*, bristle; *-aria*, possessing. The spikelets are subtended by one or more persistent bristles)

Species ~ 100, of which 14 occur in India.

Genus distribution: Tropical and warm temperate regions of the world.

Upper lemma transversely rugose; bristles persistent.

514. STENOTAPHRUM



Paniceae

20. STENOTAPHRUM Trin.
(Gk *stenos,* slender; *taphros,* ditch. The spikelets are sunken in small pits on the surface of the rhachis)

Species

Genus distribution: Plains of India, East Africa, Lower Burma, China.

Spikelets sunken in hollows in a thickened rhachis, the latter disarticulating in maturity.

514. *STENOTAPHRUM*

Stenotaphrum Trin., Fund. Agrost. 175 (1820) [1822].
Annuals or perennials, rhizomatous, stoloniferous, or caespitose. Ligule a fringed membrane. Inflorescence unbranched, or with very short primary branches sunken into the broad flattened inflorescence axis. Rachis of primary branches terminating in a point. Lower glume tiny, with no veins. Upper lemma leathery but not indurate, yellow in fruit. 2n = 18, 20, 36.
Seven spp., tropical and subtropical.



521. SPINIFEX

19. SPINIFEX L.

(L. *spina,* thorn; *facio,* make. The leaf-blades of some species have sharply tipped apices)

Species ~ 4, of which 1 species occurs in India.

Genus distribution: Australia, China, India and Sri Lanka.

Spikelets dioecious; the female solitary on axes collected into a spherical head; the male seated on a sharp-pointed rhachis, many of which are collected together terminating the culm and branches or in the axils of leaves.



Spinifex. littoreus (♂)



S. littoreus (♀)



♀ & ♂ Spikelets

525. *ERIOCHLOA*

E. fatmensis

E. procera

Eriochloa fatmensis

Paniceae

7. ERIOCHLOA Kunth

(Gk *erion,* wool; *chloa,* grass. Spikelets woolly)

Species ~ 30, distributed in the warmer regions of the world, of which 2 occur in India.

Genus distribution: Tropical parts of the world.

Lower glume and lowest internode of the rhachilla forming a swollen callus at the base of the spikelet; upper lemma mucronate or short-awned.

528. *THUAREA*

Mat-forming perennial. Ligule a fringe of hairs.Inflorescenc enclosed in the uppermost leaf, unbranched with a flattened axi with 1 or 2 bisexual spikelets proximally, and staminate spikele distally. Staminate spikelets deciduous, on bulbous pedicel Bisexual spikelets persistent; lower glume absent; upper lemm pubescent, with margins lying flat on the palea. Staminate portio of the inflorescence folds onto the bisexual portion at maturity ar encloses the fruit.

Two spp., seashores of the Old World tropics, Madagascar to Polynesia.



Thuarea involuta

529. *UROCHLOA*

U. ramosa

Urochloa reptans

U. supervacua

Paniceae

22. UROCHLOA P. Beauv.
(Gk *oura,* tail; *chloa,* grass. The fertile lemma contracts abruptly to a tail-like awn)

Species ~ 20, distributed in the tropics of the world, of which 10 occur in India.

Genus distribution: Old Tropics mainly Africa.

Upper lemma obtuse, mucronate or very short-awned.



532. Melinis P. Beauv.

Annuals or perennials, culm nodes pubescent. Ligule a fringe of hairs. Inflorescence much branched, with slender branches. Spikelets laterally compressed. Lower glume tiny or absent; upper glume awned or awnless, gibbous in some species. Lemma of lower flower awned. Lemma of the upper flower much less firm than the glumes, awnless or awned from a sinus.
2n = 36.
Twenty-two spp., Africa, tropics and south.

532. *MELINIS, RHYNCHELYTRUM, MILDBRAEDIOCHLOA*



532. *MELINIS, RHYNCHELYTRUM, MILDBRAEDIOCHLOA*

Melinis minutiflora

532. MELINIS

533. *MOOROCHLOA*



533. Moorochloa (Sm.) Veldkamp

Annuals. Ligule a fringe of hairs. Inflorescence branches unbranched, one-sided. Spikelets with the upper flower disarticulating, upper glume and lower lemma villous. Callus inconspicuous. Upper lemma and palea cartilaginous, smooth, apex muticous.

2n = 18, 36.

Three spp., Africa and Asia, but now widespread and weedy.

Moorochloa is the name given for three species formerly in Brachiaria. The type of Brachiaria is assigned to Urochloa, so a new name was needed for these species.



534. Tricholaena Schrad.

Perennials. Ligule a fringe of hairs. Inflorescence highly branched, the branches spreading. Spikelets laterally compressed. Lower glume apex truncate. Upper glume 3- to 5-veined. Lemma of lower flower without an awn. Lemma of upper flower leathery to hard.
2n = 36.
Four spp., Mediterranean region, Africa, India.

PACMAD Clade

IX. Subfamily: Danthonioideae

542. Chinochloa
548. Danthonia

PACMAD Clade

X. Subfamily: Chloridoideae

558. Halopyrum (H. mucronatum0
556. Indopoa (I. paupercula)
564. Ochthochloa (O. compressa)
567. Silentvalleya (2)



558. ***Halopyrum*** Stapf, Hooker's Icon. Pl. 25: t 2448 (1896).
Perennials with robust stolons. Ligule a fringe of hairs. Leaf blades with filiform tips, disarticulating from sheath. Inflorescence with primary branches unbranched, appressed to the main axis. Spikelets with 8 to 25 flowers. Callus of flower with straight hairs extending almost half the length of the spikelet. Glumes shorter than the spikelet. Lemma mucronate. Palea covered with long hairs. Leaf epidermal papillae one per cell. One sp., H. mucronatum (L.) Stapf, coastal areas of Africa, India, Sri Lanka. The inflorescence and the single epidermal papilla per cell suggest a possible placement in Eleusininae.



Halopyrum mucronatum

Eragrosteae

32. HALOPYRUM Stapf

(Gk *halos,* salt; *pyros,* wheat. Wheat-like and growing in coastal habitats)

Monotypic Grass Genus

Genus distribution: Shores of Indian ocean from Mozambique to Sri Lanka

Florets conspicuously bearded from callus.



Indopoa paupercula

Eragrosteae

31. INDOPOA Bor

(L. *Indus,* India. From India and resembling *Poa)*

A monotypic grass genus.

Genus distribution: India.

Spikelets in terminal solitary secund spikes; awn twisted. Lemma emarginated or 2-4 lobed or toothed at apex.



Ochthochloa compressa

Eragrosteae

34. OCHTHOCHLOA Edgew.

(Gk *ochthos,* hill; *chloa,* grass. Growing on hills)

A monotypic grass genus.

Genus distribution: Sind, Through Arabia to North-East Africa.

Racemes or secondary branches deciduous; upper glume 5-nerved. Racemes digitate.



567. Silentvalleya V.J. Nair, Sreek., Vajr. & Bhargavan

Caespitose perennials. Ligule membranous. Inflorescence branches unbranched, the branches arranged along a central axis. Spikelets with 6 or more flowers plus additional distal sterile ones.

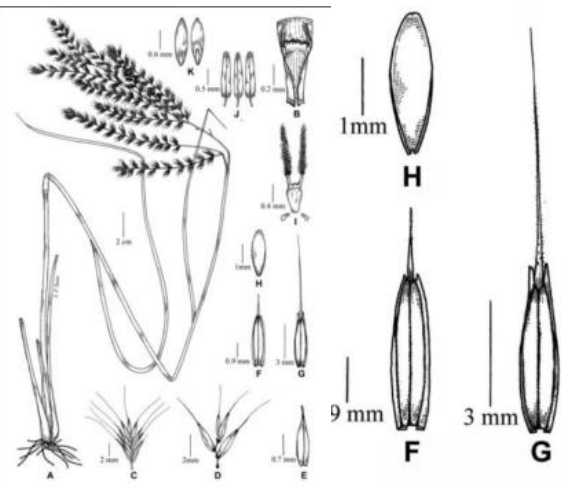
Callus of flowers pubescent. Glumes shorter than the spikelet, the apices acute to acuminate. Lemma glabrous, with an apical awn. Leaf epidermal papillae absent.

Species:2.,

S. nairii Nair, Sreek., Vaj. & Bargh., southern India. Clayton and Renvoize (1986) say that this is “like *Gouinia* [in Cynodonteae], but upper glume as long as lemma”. Also the lemma is hairy in Gouinia.

567. SILENTVALLEYA

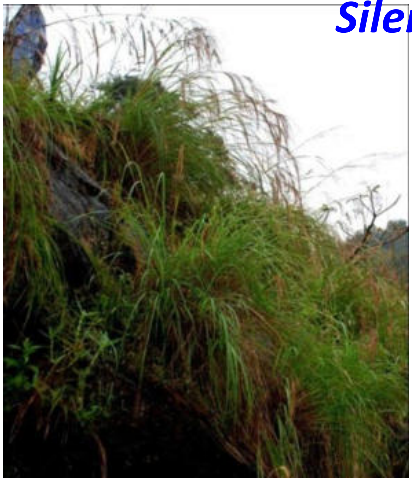


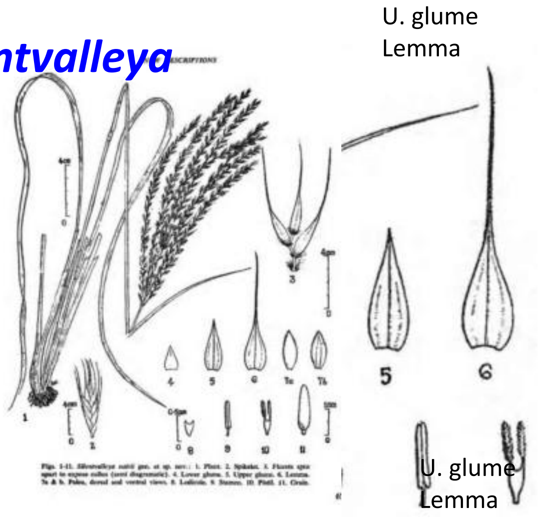


S. chandwadensis

Silentvalleya

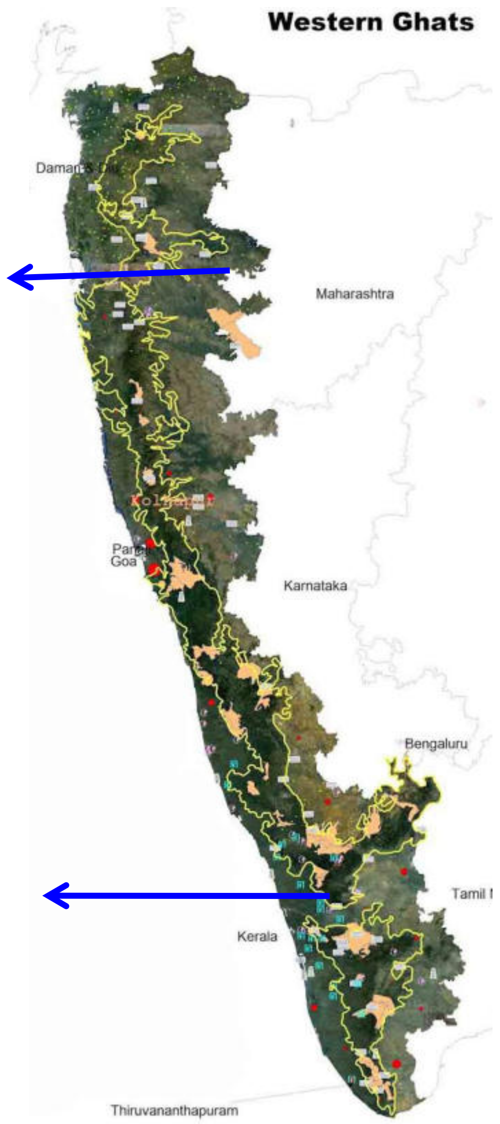
U. glume
Lemma





U. glume
Lemma

S. nairii



567. *SILENTVALLEYA*



Silentvalleya chandvadensis

Collected from Chandwad,
Dist Nashik, MS

2*n*= unknown



Silentvalleya
V.J. Nair, Sreek., Vajr.
& Bhargavan **(1 species)**

Silent valley, Kerala

2*n*= unknown



Leptochloa P. Beauv.
(5 species)

South America to Australia

2*n*= 20, 40 & 60

Subfamily Chloridoideae

PACMAD Clade

X. Subfamily: Chloridoideae

XXVII. Tribe Eragrostidae

575. Enneapogon

XXVII.2. Subtribe Eragrostinae

579. Eragrostis (437)

575. *ENNEAPOGON*

Pappophoreae

48. ENNEAPOGON P. Beauv.

(Gk *ennea*, nine; *pogon*, beard. The lemma has nine hairy awns)

Species 28.

Genus distribution: Tropics and subtropics of world, especially Australia and Africa.

Lemmas 9-nerved; the nerves produced as 9 awns. Lemmas strongly compressed or rounded.





Enneapogon elegans

575. *ENNEAPOGON*

Disarticulation in the spikelet



Persistent glumes



Spikelets breaking above glumes

Sub-family

Pooideae

579. ERAGROSTIS

E. japonica

E. cilianensis

Eragrostis unioloides

E. tenella

Eragrosteae

30. ERAGROSTIS Wolf.

(Gk *er,* early. *agrostris,* wild. Species of *Eragrostis* are commonly early invaders of arable land)

Species ~ 300, distributed in tropics and subtropics, of which 35 occur in India.

Genus distribution: Africa Asia, Australia New Zealand, Philippine, Sri-Lanka and USSR.

Spikelets awnless; lemmas more or less acutely keeled, 3-nerved; grain not rugose or hollowed out on the adaxial surface.

PACMAD Clade

X. Subfamily: Chloridoideae

XXVIII. Tribe Zoysieae

590 Zoysia

592. Crypsis

594. Sporobolus



Zoysieae

58. ZOYSIA Willd.

[In honor of Karl Zois Edelstein (1756–1800) Austrian botanist]

Species ~ 10, of which 3 species occur in India.

Genus distribution: Tropics and subtropics of the world.

Glumes of the spikelets smooth, compressed, shining; spikelets arranged in rigid, erect spikes.





Sporoboleae

52. CRYPSIS Ait.

(Gk *crypsis*, concealment. The inflorescences of some species are partially Hidden)

Species 8.

Genus distribution: Northwest India, Afghanistan westward to Mediterranean region.

Inflorescence spicate, very dense, subtended by an inflated sheath bearing a rudimentary blade.



Sporoboleae

53. SPOROBOLUS R. Br.

(Gk *sporos,* seed; *ballo,* throw. At maturity the seeds are squeezed out of the fruits)

Species ~ 150, distributed mainly in the tropics and subtropics of the world, of which 20 species occur in India.

Genus distribution: Africa, America, Asia, Australia, Philippine Islands and West Indies

Lemmas 1-3-nerved, awnless; glumes and lemmas very similar in texture, hyaline or thinly membranous, shining; grain usually with a free pericarp.

594. *SPOROBOLUS*



grain usually with a free pericarp.

PACMAD Clade

X. Subfamily: Chloridoideae

XXVIII. Tribe Cynodonteae

596. Aeluropus

602. Pommereulla (P. cornucopiae)

604. Dactyloctenium

613. Tragus

635. Leptothrium (Latipes)

642. Perotis

646. Acrachne

651. Chloris

653. Cynodon

655. Dinebra

656. Diplachne

661. Leptochloa

662. Lepturus

664. Microchloa

668. Schoenefeldia (2)

670. Tetrapogon (5)

671. Trichloris (2)

675. Eleusine

596. *AELUROPUS*







Aeluropodeae

1. AELUROPUS Trin.

(Gk *aelouros*, cat; *pous*, foot. *The* inflorescence bears a fanciful resemblance to a cat's paw)

Species ~ 6. One occurs in India.

Genus distribution: Mediterranean region to India.

Inflorescence a simple spike or globular head of spikelets; spikelets villous; leaves rigid, pungent; ligule a rim of hairs.

602. *POMMEREULLA*







Pommereulleae

51. POMMEREULLA L. f.

(In honor of Madame Du-gage née Pommereul, French botanist especially interested in grasses)

A monotypic grass genus

Genus distribution: South India and Ceylon.

Spikelets 2-3 flowered, turbinate; glumes narrow, persistent; lower two lemmas empty, flabelliform, 4-lobed, dorsally shortly awned

602. *POMMEREULLA*







Dactyloctenium aegyptium

Eragrosteae

23. DACTYLOCTENIUM Willd.
(Gk *daktylos,* finger; *ktenion,* a little comb. The finger-like inflorescence branches resemble small combs)

Species ~ 13, distributed in tropical, subtropical and warm temperate regions of the world, 4 occur in India.

Genus Distribution: Distributed in warmer countries Africa, America, Australia, Bangladesh, Burma, Europe, Malaysia, Malaya Peninsula, Nepal, New Zealand and New Guinea.

Axis of spikes terminating in a sharp point; upper glume mucronate or awned; spikes digitate, rarely racemose.



Dactyloctenium scindicum

Eragrosteae

23. DACTYLOCTENIUM Willd.

Spikes 0.5-2 cm long; plants glaucous; leaves 2.5-4 cm long, stiff; back of rhachis with a slit-like groove on each side of the keel.



Zoysieae

57. TRAGUS Hall.

[Gk *tragos*, he goat. In honor of Hieronymus Bock (1498–1554) German physician, educator, botanist whose surname translates into Greek as Tragus]

Species ~ 7, widely distributed in tropics and subtropics of the world, of which 1 occurs in India.

Genus distribution: Throughout the tropics, occurs chiefly in Asia, Europe, Africa, North and South America.

Spikelets in pairs, crowded on short pedicels, face to face, lower glumes armed with hooked spines, upper glume smooth.

642. *PEROTIS*

Perotis indica



Perotideae

49. PEROTIS Ait.
(Gk *peros,* mutilated; *ous,* ear. The lemma is awnless)

Species ~ 10, distributed in the tropics of the world, of which 2 occur in India.

Genus Distribution: Afghanistan, Africa, Australia, Burma, China, Java, Malaya, Nepal, Sri Lanka and Philippines.

Lemma delicate, 1-3-nerved. Spikelets solitary; glumes awned.


642. PEROTIS
Perotis
X. Subfamily Chloridoideae

642. *PEROTIS*

Perotis

X. Subfamily Chloridoideae

642. *PEROTIS*

642. ***Perotis*** Aiton Fig. 90
Perotis Aiton, Hort. Kew. 1: 85 (1789).
Lopholepis Decne., Arch. Mus. Hist. Nat. 1: 147 (1839), nom. nov. pro seq. Holboellia Hook. Toliara Judz., Adansonia III, 31: 274 (2009).
Annuals or perennials, most caespitose. Leaf blades stiff, with a sharp apex. Ligule membranous or a fringe of hairs. Inflorescence sometimes
partially enclosed by the subtending leaf. Spikelets more or less terete. Glumes longer than the flowers, with long awns. Lemma apex entire, awnless.



Zoysieae

56. LOPHOLEPIS Decaisne
(Gk *lophos,* crest; *lepis,* scale. Lemma apex shortly awned)

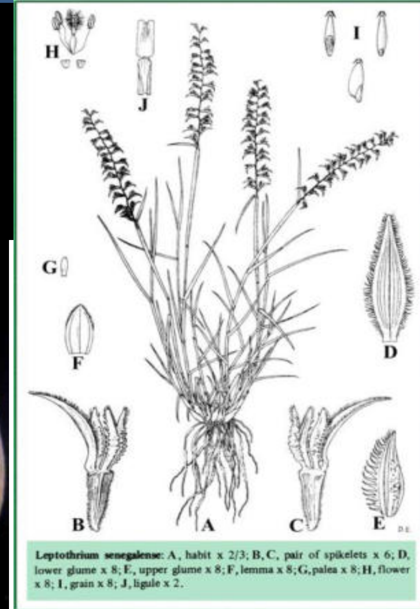
Species 1.

Genus distribution: Southern India and Srilanka.

Spikelets minute (racemosely arranged on a long axis) exactly the shape of a bird's head in outline.

635. *LEPTOTHRIUM* (*Latipes*)

635. Leptothrium Kunth & Latipes Kunth



Leptothrium senegalense: A, habit x 2/3; B, C, pair of spikelets x 6; D, lower glume x 8; E, upper glume x 8; F, lemma x 8; G, palea x 8; H, flower x 8; I, grain x 8; J, ligule x 2.









Leptothrium senegalensis (L. Senegalensis)



Acrachne racemosa

Eragrosteae

21. ACRACHNE Wt. et Arn.

(Gk *akros,* at the tip; *achne,* scale. Racemes terminate in an aborted spikelet)

Species about three two occurs in India and also in Maharashtra.

Genus distribution: Old World tropics. Abyssinia, southern Africa, Indochina, Indo-malayan region, Australia.

Spikes usually in pseudo-whorls or scattered; spikelets 8-20 flowered; grain coarsely rugose, grooved or hollowed on one face, with an early deciduous pericarp.

651. *CHLORIS*

Chlorideae

Chloris barbata



12. CHLORIS Sw.

(The Greek goddess of flowers)

Species ~ 60, of which 10 occur in India.

Genus Distribution: Distributed in warmer regions of the world.

Spikes not falling entire; imperfect florets or reduced lemma awned. Spikes 4 or more; florets one only.

653. *CYNODON*



Cynodon dactylon

Chlorideae

13. CYNODON Rich.
(Gk *kyon,* dog; *odous,* tooth. From chiendent the French name for the commonest species)

Species ~ 8, of which 4 occur in India.

Genus distribution: Distributed mostly in South Africa and Australia.

Spikelets with one fertile floret and no imperfect florets. Spikelets awnless.



Eragrosteae

25. DINEBRA Jacq.

(Arabic *danaiba,* a little tail. The apices of the glumes are prolonged)

Species 3, of which 1 occurs in India.

Genus distribution: Africa, Asia, Iraq, Egypt and Europe.

Spikelets sessile on the flattened branches of a narrow panicle, 2-3 flowered.

656. *DIPLACHNE*

Diplachne fusca



Eragrosteae

26. DIPLACHNE P. Beauv.
(Gk *diploos,* double; *achne,* lobe. The lemma is two-lobed)

A monotypic grass genus

Genus distribution: Widespread, extending from Egypt and Tropical and South Africa throughout south East Asia to Australia.

Racemes loosely spiculate; spikelets linear-oblong, subterete; lemmas more or less rounded on the back.

661. *LEPTOCHLOA*

Eragrosteae

33. LEPTOCHLOA P. Beauv.
(Gk *leptos,* narrow; *chloa,* grass. Inflorescence a slender spike)

Species ~ 40 of which 5 occur in India.

Genus distribution: Throughout the tropics, warm temperate parts of America and Australia.

Racemes densely spiculate, conspicuously secund; spikelets oblong, laterally compressed; lemmas keeled.

Leptochloa chinensis



Leptureae

43. LEPTURUS R. Br.

(Gk *leptos,* narrow; *oura,* tail. – (1) Inflorescence a cylindrical spike. *Setaria leptura* – (2) awns filiform. *Aristida leptura*)

Species about 15 out of of which one occurs in India.

Genus distribution: Coasts of East Africa, Madagascar to Australia and Polynesia.

Lemma of the first floret with its back adjacent to the rhachis; lower glume completely absent.

664. *MICROCHLOA*

Chlorideae

15. MICROCHLOA R. Br.

(Gk *mikros,* small; *chloa,* grass. Some species of the genus are small plants)

Species ~ 6, distributed in tropical and subtropical regions, of which 2 occur in India.

Genus distribution: Eastern Asia, Africa, North and South America, Malaya and Philippine.

Inflorescence a long curved secund spike of 1-flowered awnless spikelets.

Microchloa indica



668. *SCHOENEFELDIA*

Chlorideae

17. SCHOENEFELDIA Kunth

[In honor of Melchior Schoenefeld (fl. 1619) German botanist]

Species ~ 2. One occurs in India.

Genus distribution: Africa and Madagascar.

Spikelets not sunk in rhachis. Awns of the spikelets 12-15 mm long.

Schoenefeldia gracilis

670. *TETRAPOGON*

Chlorideae

18. TERTAPOGON Desf.

(Gk *tetra,* four; *pogon,* beard. Spikelets usually with awns on the subtending glumes and two lemmas)

Species ~ 5, distributed in North Africa, Abyssinia and Asia, of which 2 occur in India.

Genus distribution: Africa and Middle East Asia.

Imperfect florets or reduced lemma awned. Spikes 1-3; fertile florets 2 or more.





Tetrapogon tenellus

674. *COELACHYRUM*

Coelachyrum lagopoides



Eragrosteae

22. COELACHYRUM Hochst. Et Nees

(Gk *koilos,* hollow; *achyron,* chaff. The grains are concave on the lemma side of the rhachis)

Species 2.

Genus distribution: South India, Ceylon and Baluchistan

Lemmas rounded on the back, 3-5 nerved; grain hollowed out on the adaxial surface, rugose on the other.

675. *ELEUSINE*







Eragrosteae

27. ELEUSINE Gaertn.

(The Ancient Greek town of Ceres, where the Goddess of the harvest was worshipped)

Species ~ 9, distributed in tropical and subtropical Africa and Asia, of which 3 occur in India.

Genus distribution: Africa, America, Asia, Australia, Malaysia, New Zealand, New Guinea, Sri-Lanka and West Indies.

Spikelets digitate or subdigitate; spikelets 3-6 flowered; glumes 1-5 nerved; grain oblong to globose, grooved, with a conspicuous pericarp.



661. Leptochloa P. Beauv.
Perennials,caespitose, rhizomatous or stoloniferous. Ligule short, membranous. Inflorescence branches unbranched, sub-digitate or spread along a central axis. Spikelets laterally compressed, with 1 to 7 flowers plus additional reduced flowers distally. Glumes shorter or longer than the flowers, generally muticous. Callus of flower pubescent or glabrous. Lemma apex awnless, or with 1 to 3 awns. Fruit smooth, pericarp free from, adherent to or fused to seed coat.

2n =20, 40, 60.

Five spp., southern U.S. to South America,
Australia.

Molecular data show that Leptochloa as traditionally circumscribed is polyphyletic (Columbus et al. 2007; Peterson et al. 2010a, 2012), consistent with previous data from morphology and anatomy (Snow 1997). Monophyly is restored once Dinebra, Diplachne and Disakisperma are redefined, and Trigonochloa is recognized

PACMAD Clade

X. Subfamily: Chloridoideae

Subtribe: Tripogoninae
676. Desmostachya
677. Eragrostiella
678. Melanocenchris
679. Oropetium
680. Tripogon

Subtribe: Pappophorinae
682. Pappophorum



Eragrosteae

24. DESMOSTACHYA (Hook. f.) Stapf

(Gk *desmos*, anything used for tying; *stachys*, spike as of an ear of wheat. The stems and inflorescences are used for string in North Africa and the Middle East)

A monotypic grass genus

Genus Distribution: Northern Africa, through the Middle East to India and Indo China

Spikelets falling entire at maturity from the axis of straight spikes, the latter numerous and crowded into a long narrow dense panicle; glumes 1-nerved.



Eragrostiella bifaria

Eragrosteae

29. ERAGROSTIELLA Bor (L. *-ella,* diminutive but here used as a name-forming suffix. Similar to *Eragrostis*)

Species 7 distributed in Burma and Ceylon, of which 5 occur in India.

Genus distribution: Eastern Africa to Burma and Northern Australia.

Inflorescence a solitary secund spike.

678. *MELANOCENCHRIS*

Chlorideae

14. MELANOCENCHRIS Nees

(Gk *melas,* black. The glumes and lemma have scabrid purplish awns and the mature spikelets resemble the burr of *Cenchrus)*

Species 3, distributed in tropical Asia and India.

Genus distribution: Chad to India and Sri Lanka.

Inflorescence of spaced clusters of awned spikelets on a simple rhachis.



Manisuris jaquemontii

678. *MELANOCENCHRIS*





678. ***Melanocenchris*** Nees
Melanocenchris Nees, Proc. Linn. Soc. Lond. 1: 94 (1841).
Annuals or perennials, less than 30 cm tall. Ligule a fringe of hairs. Inflorescence a densely capitate cluster of unbranched branches, these ending in a forked bristle. Spikelets wedge-shaped, dorsiventrally compressed, with 1 flower plus several reduced flowers distally. Glumes next to each other, shorter than or reaching the apex of the flowers, coriaceous, with long hairs, awned; upper glume with broad wings basally. Lemma with clavate hairs, with 1 or 3 awns.
Three spp., tropical Africa, India, Sri Lanka.

679. *OROPETIUM*

Chlorideae

16. OROPETIUM Trin.

(Gk *oros,* mountain; *peta,* seek. Growing on high mountains)

Species ~ 6, of which 3 occur in India.

Genus distribution: Africa and India.

Inflorescence a simple spike or spikes of awned or awnless spikelets. Spikelets more or less sunk in the thick tough rhachis.





680. *TRIPOGON*

Eragrosteae

35. TRIPOGON Roem. et Schult.

(Gk *treis,* three; *pogon,* beard. The lemmas have three apical awns and three basal hair-tufts)

Species ~ 30, distributed in tropical and subtropical Asia and Africa, of which 13 occur in India.

Genus Distribution: Asia, Australia, New Zealand, Sri-Lanka and Philippine.

Spikes in terminal solitary secund spikes.



Tripogon lisboae



T. jacquemontii



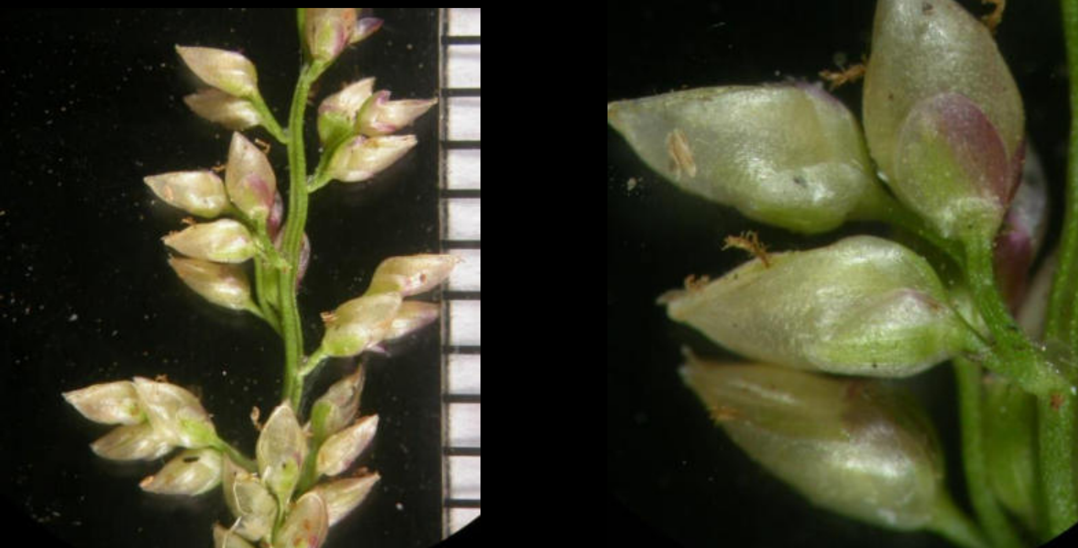
T. capillatus

PACMAD Clade

XI. Subfamily: Micrairoideae

687. Coelachne (12)
689. Hubbardia (2)
690. Isachne(103)
691. Limnopoa (L. meeboldii)

687. *COELACHNE*





Isachneae

41. COELACHNE R. Br.

(Gk *koilos,* hollow; *achne,* scale. The subtending glumes are firm and basin-shaped)

Species ~ 10, of which 3 species occur in India.

Genus distribution: Old World Tropics.

Glumes equal in size, obtuse or mucronate; upper lemma unawned.

687. *COELACHNE*

Colanchne minuta



689. *HUBBARDIA*





Hubbardia heptaneuron

Hubbardieae

40. HUBBARDIA Bor
[In honor of Charles Edward Hubbard (1900–1980) English agrostologist]

A monotypic grass genus.

Genus distribution: India.

Spikelets 1-flowered; lemmas faintly 7-nerved; leaves extraordinarily thin; ligule absent.



Isachneae

42. ISACHNE R. Br.
(Gk *isos,* equal; *achne,* scale. Glumes more or less similar)

Species ~ 110, distributed in the tropics and subtropics of the world, of which about 29 species occur in India.

Genus distribution: throughout the tropics, but mainly in Asia.

Spikelets usually 2-flowered, pedicelled in open or contracted panicles; upper lemma becoming indurated; glumes finally deciduous.

691. Limnopoa



691. **Limnopoa** C. E. Hubb., Hooker's Icon. Pl. 35: t. 3432 (1943).

- Floating annuals, less than 25 cm tall.
- Ligule a fringe of hairs.
- Inflorescence unbranched, the spikelets in pairs, one sessile, one pedicellate, borne on one side of the inflorescence axis.
- Spikelets dorsiventrally compressed, with 2 flowers, the proximal one staminate, the distal one bisexual.
- Glumes shorter than the flowers, the lower one with an acute apex, the upper one obovate and with an obtuse apex.
- Lemma pubescent, the apex obtuse. Hilum long-linear.
- Leaf epidermal papillae one per cell.

One sp., *L. meeboldii* (C.E.C. Fisch.) C.E. Hubb., tropical Asia.



691. Limnopoa


691. *Limnopoa*
XI Subfamily Micrairoideae

PACMAD Clade

XII. Subfamily: Arundinoideae

694. Arundo (3)
697. Elytriphorus(2)
698. “Eragrostis” walteri
703. Phragmites (4)
706. Zenkeria (5)
708. Danthonidium (D. gammiei)

694. *ARUNDO* L



Arundo L.,
Sp. Pl. 1: 81 (1753); tax.: Hardion et al. (2012).

- Reeds over 2 m tall, rhizomatous.
- Leaves cauline, the blades disarticulating from the sheaths.
- Ligule membranous, with short cilia. Inflorescence branches branched.
- Spikelets with 2 to 5 flowers, with a rachilla extension.
- Glumes as long as the flowers, their apices acute to acuminate.
- Lemma villous proximally, the apex entire or bidentate, mucronate or awned from the sinus and from the lobes.
- Hilum short.
- 2n = 24, 100, 110.

Three spp., southern Europe and northern Africa to China, introduced worldwide.



ARUNDO L.

(Latin name for a reed, stemming from Celtic *aru,* water. Grows in swamps)

Species ~ 12, distributed in the tropical and subtropical regions of the world, of which 1 occurs in India.

Genus distribution: Africa, America, Australia, Burma, Europe, East and West Asia, New Zealand, Pakistan, U. S. S. R. and North West Indies.

Lemmas bearing long silky hairs which envelop the lemma; lemmas awnless or with a straight awn from the tip, often thin, tall grasses with usually large plume-like panicles.



ELYTROPHORUS P. Beauv.
(Gk *elytron,* cover; *phero,* bear. Lower glume of outer fascicle of spikelets enlarged)

Species 2, of which 1 occurs in India.

Genus distribution: Australia, Burma, Bangladesh, Malaya, New Zealand, Sri Lanka and Tropical Africa.

Spikelets awned, in dense globose clusters.



PHRAGMITES Adans.

(Gk *phragma,* a hedge; *-ites,* resembling. Name used by Dioscorides for a species whose stems were used for making hedges)

Species about 3, of which 2 occur in India and 1 in this region.

Genus distribution: Africa, Australia, Europe, East and West Asia.

Rhachilla-joints bearing long silky hairs which envelop the lemma; lemmas awnless or with a straight awn from the tip, often thin, tall grasses with usually large plume-like panicles.


703. PHRAGMITES


703. PHRAGMITES

706. *ZENKERIA*





Zenkeria elegans

ZENKERIA Trin.

[In honor of Jonathan Karl Zenker (1799–1837) German botanist]

Species 4.

Genus distribution: India and Srilanka.

Leaves flat; glumes spreading, ovate, about half the length of the lemmas; lemmas membranous, obtuse or acuminate, not awned.

708. *DANTHONIDIUM*



DANTHONIDIUM C. E. Hubb.

(Gk *-idium,* diminutive but here used as a name-forming suffix. Similar to *Danthonia* with respect to spikelets)

A monotypic grass genus.

Species 1.

Genus Distribution: India

Lemmas awned from the sinus between the two terminal lobes or no trace of an awn, often only a mucro; ligule a hairy rim.


THANK YOU

Scrotochloa urceolata (Roxb.) Judz. (Leptaspis urceolata)

HERB. HORT. KEW.

ROYAL BOTANIC GARDENS KEW
K000576278

77

Scrotochloa urceolata (Roxb.) Judz.
DET. T.A. COPE 16/12/2009

Harapan Rainforest
Plants of Indonesia

Poaceae
Local name:
Indonesia, Sumatra: Provinsi Jambi, Kabupaten Batanghari, Harapan Rainforest, Bolian

GPS: 02°05'14.6"S 103°17'36.7"E; ketinggian 112 m
Disturbed secondary forest. Clay soil

Herb without stolon, forming a cluster, height 70 cm, diameter 2 cm. Fruit base of infructescence stalk pale yellow/green, fruits pale green/brown with white hairs. 'Bracts' around fruit pale green with yellowish brown tips. No sap.
Lain lain:
Kegunaan:

Kolektor dan nomor: Alison Moore AM 77
Tanggal: 02 April 2008

Tim koleksi: Rogier de Kok; Selatieli Daeli; Sumarno

Burung Indonesia, RSPB, BirdLife International, Darwin Initiative.

cm 0 1 2 3 4 5 6 7 8 9 10

Kew





Acrachne racemosa Heyne ex R. & S.) Ohwi



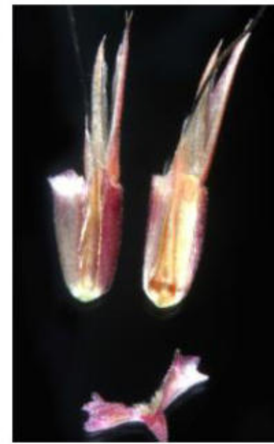
Acroceras munroanum (Balansa) Henrard



Aeluropus lagopoides (L.) Trin. ex Thw.



Alloteropsis cimicina (L.) Stapf.



Andropogon pumilus Roxb.



Apluda mutica L.



Apocopis vaginata Hack.



Aristida funiculata Trin. & Rupr.



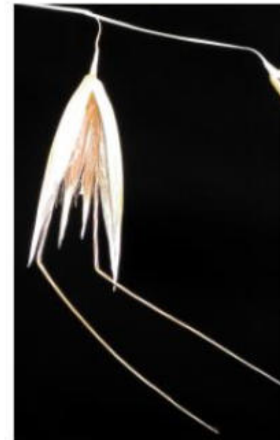
Arthraxon lanceolatus var. *lanceolatus* (Roxb.) Hochst.



Arundinella tuberculata Munro ex Lisboa



Arundo donax L.



Avena sterilis L. ssp. *ludoviciana* (Dur.) G. M. Gillet & Magne


Axonopus compressus (Sw.) P. Beauv.


Bambusa arundinacea (Retz.) Willd.


Bhidea burnsiana Bor


Cenchrus biflorus Roxb.


Centotheca lappacea (L.) Desv.


Chandrasekharania keralensis V. J. Nair, Ramchandran, Sreekumar


Chionachne koenigii (Spreng.) Thw.


Chloris quinquesetica Bhide


Chrysopogon fulvus (Spreng.) Chiov.


Cleistachne stocksii Hook.f.


Coelachne perpusilla (Arn. ex Steud.) Thwaites


Coix gigantea J. Konig



Chionachne koenigii (Spreng.) Thw.



Chloris quinquesetica Bhide



Chrysopogon fulvus (Spreng.) Chiov.



Cleistachne stocksii Hook.f.



Coelachne perpusilla (Arn. ex Steud.) Thwaites



Coix gigantea J. Konig



Cymbopogon gidarba (Buch.-Ham. ex Steud.) A. Camus



Cynodon barberi Rang. & Tadul.



Cyrtococcum oxyphyllum (Hochst. ex Steud.) Stapf



Dactyloctenium aegyptium (L) Willd.



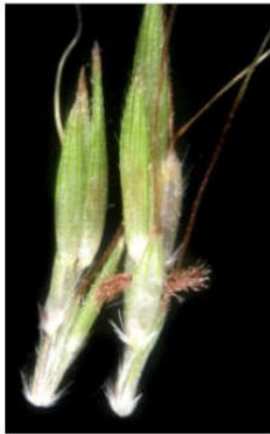
Danthonidium gammiei (Bhide) C. E. Hubb.



Dendrocalamus strictus (Roxb.) Nees



Desmostachya bipinnata (L.) Stapf



Dichanthium filiculme (Hook. f.) S. K. Jain & Deshp.



Diectomis fastigiata (Sw.) P. Beauv.



Digitaria bicornis (Lam.) Roem. & Schult.



Dimeria gracilis Nees ex Steud.



Dinebra retroflexa (Vahl) Panz.



Diplachne fusca .) P. Beauv. ex Roem. & Schult.



Echinochloa colonum (L.) Link



Ehrharta erecta Lamk.



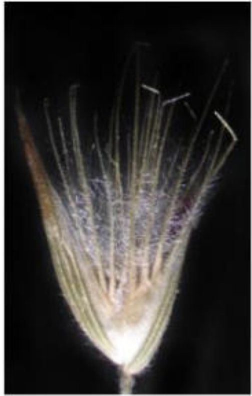
Eleusine indica (L.) Gaertn.



Elyonurus royleanus Nees ex A.Rich.



Elytrophorus spicatus (Willd.) A.Camus



Enneapogon schimperianus (Hochst. ex A. Rich.) Renvoize



Enteropogon monostachyos (Vahl) K. Schum



Eragrostiella bifaria (Vahl) Bor



Eragrostis tenella var. *tenella* (L.) P. Beauv. ex Roem. & Schult.



Eriochloa procera (Retz.) C.E.Hubb.



Euclasta clarkei (Hack.) Cope



Eulalia fimbriata (Hack.) Kuntze



Eulaliopsis binata (Retz) C.E.Hubb.



Garnotia tenella (Arn. ex Miq.) Janowski



Glyphochloa forficulata (C. E. C. Fischer) W.D.Clayton



Helictotrichon schmidii (Hook.f.) Henrard



Hemarthria compressa (L.f.) R. Br.



Eulalia fimbriata (Hack.) Kuntze



Eulaliopsis binata (Retz) C.E.Hubb.



Garnotia tenella (Arn. ex Miq.) Janowski



Glyphochloa forficulata (C. E. C. Fischer) W.D.Clayton



Helictotrichon schmidii (Hook.f.) Henrard



Hemarthria compressa (L.f.) R. Br.



Heteropogon ritchiei (Hook.f.) Blatt. & McCann



Hubbardia heptaneuron Bor



Hygroryza aristata (Retz.) Nees ex Wright & Arn.



Hymenachne acutigluma (Steud.) Gilliland



Imperata cylindrica (L.) Raeusch.



Indopoa paupercula (Stapf) Bor



Isachne gracilis C.E.Hubb.



Ischaemum diplopogon Hook.f.



Iseilema anthephoroides Hack.



Jansenella griffithiana (C. Mull. Stuttg.) Bor



Leersia hexandra Sw.



Leptochloa chinensis (L.) Nees



Lepturus radicans (Steud.) A. Camus



Lolium temulentum L.



Lopholepis ornithocephala (Hook.) Steud.



Lophopogon tridentatus (Roxb.) Hack.



Manisuris myuros L.



Melanocenchris jacquemontii Jaub. & Spach



Microchloa indica (L. f.) P. Beauv.



Mnesithea granularis (L.) Koning & Sosef



Moorochloa eruciformis (Sm.) Veldkamp



Ochthochloa compressa (Forssk.) Hilu



Ophiuros bombaiensis Bor



Oplismenus burmannii (Retz.) P.Beauv.



Oropetium thomaeum (L.f.) Trin.



Oryza rufipogon Griff.



Panicum repens L.



Paspalum canarae var. *fimbriatum* (Bor) Veldkamp



Pennisetum pedicellatum Trin.



Perotis indica (L.) Kuntze



Oropetium thomaeum (L.f.) Trin.



Oryza rufipogon Griff.



Panicum repens L.



Paspalum canarae var. *fimbriatum* (Bor) Veldkamp



Pennisetum pedicellatum Trin.



Perotis indica (L.) Kuntze



Phalaris minor var. *nepalensis* (Trin.) Bor



Phragmites vallatorius (L.) Veldkamp



Poa annua L.



Pogonachne racemosa Bor



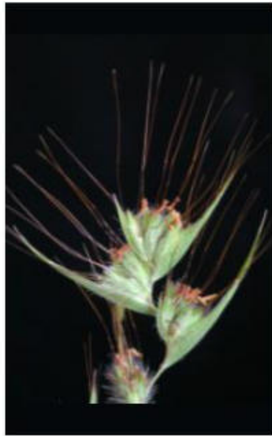
Pogonatherum crinitum (Thunb.) Kunth



Polypogon monspeliensis (L.) Desf.



Porteresia coarctata (Roxb.) Tateoka



Pseudanthistiria heteroclita (Roxb.) Hook.f.



Pseudodichanthium serrafalcoides (Cooke & Stapf) Bor



Pseudopogonatherum contortum (Brongn.) A. Camus



Pseudoraphis spinsescens (R.Br.) Vickery



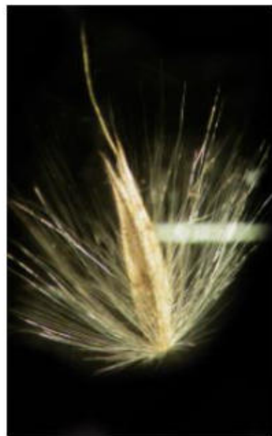
Pseudosorghum fasciculare (Roxb.) A.Camus



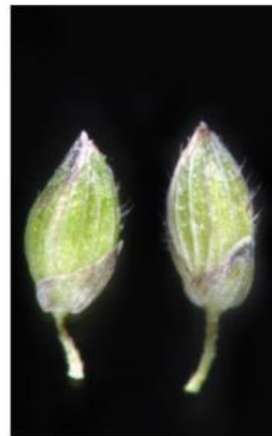
Rhynchelytrum repens (Willd.) C.E.Hubb.



Rottboellia cochinchinensis (Lour.) Clayton



Saccharum spontaneum L.



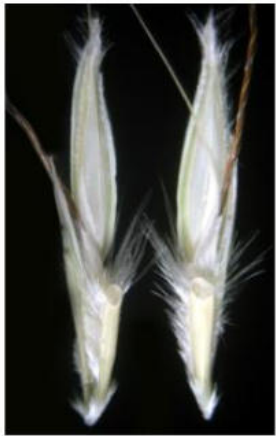
Sacciolepis myosuroides (R. Br.) Chase ex E. G. Camus



Schizachyrium exile (Hochst.) Pilg.



Schoenefeldia gracilis Kunth



Sehima nervosum
(Rottler ex Roem. & Schult.) Stapf



Setaria intermedia
Roem. & Schult.



Sorghum deccanense
Stapf ex Raizada



Spinifex littoreus
(Burm.f.) Merr.



Spodiopogon rhizophorus
(Steud.) Pilg.



Sporobolus virginicus
(L.) Kunth



Tetrapogon tenellus
(J. Konig ex Roxb.) Chiov.



Thelepogon elegans Roth



Themeda pseudotremula
Potdar, Salunkhe & S. R. Yadav



Thysanolaena latifolia
(Roxb. ex Hornem.) Honda



Trachys muricata (Linn.) Pers



Tragus biflorus Schut.



Tetrapogon tenellus (J. Konig ex Roxb.) Chiov.



Thelepogon elegans Roth



Themeda pseudotremula Potdar, Salunkhe & S. R. Yadav



Thysanolaena latifolia (Roxb. ex Hornem.) Honda



Trachys muricata (Linn.) Pers



Tragus biflorus Schut.



Tricholaena teneriffae (L. f.) Link



Triplopogon ramosissimus (Hack.) Bor



Triticum aestivum L.



Urochloa ramosa (L.) T. Q. Nguyen



Vetiveria zizanioides (L.) Nash



Zoysia matrella (L.) Merr.